MINERALOGICAL ABSTRACTS

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Notices of Books.

LAVERDIÈRE (J. W.) & MORIN (L. G.). *Initiation à la géologie.* Montréal (Éditions Fides), 1941, 158 pp., 176 figs. Price $0.90.

While there is no shortage of introductions to geology written in English this attractive work will be widely welcomed by students and general readers who are more familiar with the French tongue. Following accepted lines, the story of the earth is told in clear and simple language and abundantly illustrated with appropriate drawings and photographs that reveal the authors' close acquaintance with the geology of the Province of Quebec. M. A. P.

SHORT (M. N.). *Microscopic determination of the ore minerals.* Second edition. Bull. U.S. Geol. Survey, 1940, no. 914, viii+314 pp., 14 pls., 33 text-figs. Price $1.00.

This work is a revision and substantial expansion of the author's indispensable manual [M.A. **5**–4], incorporating the new data in the mimeographed 'Revision of Part 3, determinative table', 1934. Important technical advances include the cutting of ores with carborundum or alundum disks and mounting in bakelite. The measurement of reflectivity with the microphotometer and with photoelectric cells and the use of the quartz spectrograph are described as important recently developed aids in identification, but X-ray methods are not mentioned. The determinative table based on hardness, anisotropism, and etch reactions has been revised, but the data for the Binn minerals are still meagre and 'dyscrasite' now appears in ten places. The section on micro-chemical tests contains important improvements, the indexes are better arranged, and coated paper is used throughout. [The author will supply a list of errata.] M. A. P.

WILLIAMS (Howel). *Crater Lake, the story of its origin.* Berkeley (University of California Press), 1941, xii+99 pp., 11 pls., 8 text-figs. (Cambridge Univ. Press, price 10*s.* 6*d.*)

This slim and highly priced volume gives a popular account in a

rather unusual style of the unique Crater Lake in Oregon. The author, who is professor of geology in the University of California, has studied volcanoes and especially calderas in many lands. The crater, or rather caldera, is 5–6 miles across, and the lake inside a complete circular rim of steep cliffs is 1996 feet deep. The extinct volcano ('Mount Mazama') of which it is a remnant was built up in the Pleistocene period with earlier andesites and later dacites. The explosive phase at the end of the glacial period produced much pumice and dust which were spread out over a wide area, and beneath them some man-made implements have been found. As the estimated volume of this debris is much less than the estimated volume of the demolished mountain, it is supposed that the caldera is the result of subsidence into the drained magma reservoir beneath. There is, however, no mention of faulting and slickensiding (apart from glacial striae) in the rocks. 'Part one: the story' gives a graphic and vivid account of the sequence of events, as if eyewitnessed by our special correspondent, describing in detail the landscape, climate, fauna, and flora at the various stages, and even the time of day, direction of the wind, and alarm of the Indians at the climax of destruction. Two coloured plates show the mountain just before and just after its destruction. 'Part two: the evidence' is given in the form of a dialogue between a guide-naturalist of the park service and a party of tourists, demonstrating how geologists make deductions from observations. L. J. S.

Cotton (C. A.). *Landscape as developed by the processes of normal erosion.* Cambridge (University Press), 1941, xvi+301 pp., 45 pls., 214 text-figs. Price 21*s*.

The author of this excellent treatise is professor of geology in Victoria University College at Wellington, New Zealand, and many of the examples and illustrations of scenery he gives are from that country. The illustrations are a prominent feature: in addition to the series of plates, there are very effective line drawings of scenery and explanatory block diagrams. His study of geomorphology [M.A. 7–416] was inspired and is based on the work of W. M. Davis [1850–1934]; and during the past thirty years he has himself contributed several original papers on the subject. The information he has collected together is now presented in logical sequence, showing how forms of scenery are dependent on geological structure and pass through a definite cycle of changes.

L. J. S.

New Minerals.

Gordon (Samuel G.). *Results of the Chilean mineralogical expedition of 1938. Part V.—Cadwaladerite, a new aluminium mineral from Cerro Pintados, Chile.* Notulae Naturae, Acad. Nat. Sci. Philadelphia, 1941, no. 30, 4 pp., 1 fig. [M.A. **8**–181.]

Amorphous grains in halite are lemon-yellow with vitreous lustre and conchoidal fracture; sp. gr. 1·66, n 1·513, isotropic. Analysis by W. Pitman gave Al_2O_3 27·50, CaO 2·07, Na_2O 1·85, K_2O 0·90, Cl 22·96, SO_3 0·82, H_2O+ 24·99, H_2O- 25·13, total (less 5·18), 101·04. Deducting gypsum, NaCl, KCl, and $CaCl_2$, the formula is deduced as $AlOCl.5H_2O$ or $Al(OH)_2Cl.4H_2O$. L. J. S.

Gordon (Samuel G.). *Slavikite, butlerite, and parabutlerite from Argentina.* Notulae Naturae, Acad. Nat. Sci. Philadelphia, 1941, no. 89, 8 pp., 11 figs.

Veins of oxidized pyrite in the Santa Elena mine, La Alcaparrosa, prov. San Juan [M.A. **7**–107] contain a variety of sulphates, including ferropallidite (= szomolnokite), *calingastite* (zinciferous melanterite $(Fe,Zn,Cu)SO_4.7H_2O$), copiapite, fibroferrite, botryogen, hohmannite, goslarite, gypsum, epsomite, pickeringite, &c., and native sulphur. Slavikite occurs as cress-green masses of minute rhombohedral crystals tabular on (0001) with $(10\bar{1}1)$, $a:c = 1:1·389$, cr 58° 39′; sp. gr. 1·99, ϵ 1·497, ω 1·533. Analysis by P. Collins, SO_3 34·62, Fe_2O_3 23·93, MgO 4·40, Na_2O 0·29, H_2O 37·21 = 100·45, gives the formula $MgFe_3(SO_4)_4(OH)_3.18H_2O$. Measurement of a crystal of slavikite from Bohemia [M.A. **3**–365] gave cr 58° 38′ (not 50°). The dimorphous minerals butlerite [M.A. **4**–11] and parabutlerite [M.A. **7**–223], $Fe_2O_3.2SO_3.5H_2O = Fe(OH)SO_4.2H_2O$, occur as minute orange-ochre crystals. Butlerite is monoclinic, $a:b:c = 0·8752:1:0·7897$, β 71° 25′, cleavage (100), twinning on $(\bar{1}05)$; sp. gr. 2·55; α 1·593, β 1·665, γ 1·741, $\gamma = b$, $\alpha:c = -18°$, 2V near 90°, positive. Parabutlerite is orthorhombic, $a:b:c = 1·3568:1:0·9778$, cleavage (101), twinned on (412); α 1·589, β 1·660, γ 1·750, $Bx_\alpha \perp$ (100), $\beta = c$, 2E 76°, negative. The two form oriented intergrowths, the planes a and c of butlerite (ac 71° 25′) being nearly parallel to (101) and $(\bar{1}01)$ (ee 71° 34′) of parabutlerite. L. J. S.

Angelelli (Victorio) & Gordon (Samuel G.). *Sarmientite, a new mineral from Argentina.* Notulae Naturae, Acad. Nat. Sci. Philadelphia, 1941, no. 92, 4 pp., 1 fig.

Orange-yellow nodules of sarmientite occur in fibroferrite with several

other sulphates in an oxidized pyrite vein in diabase in the Santa Elena mine, La Alcaparrosa, prov. San Juan [M.A. **7**–107]. The minute (2–25 μ) crystals are monoclinic with prismatic habit; $a:b:c = 0{\cdot}3415:1:0{\cdot}5242$, β 82° 21′, forms b(010), m(110), w(011). Sp. gr. 2·58, α 1·628, β 1·635, γ 1·689; positive. Analysis by P. Collins, As_2O_5 22·68, SO_3 18·28, Fe_2O_3 36·57, CaO 0·27, H_2O 22·86 = '100·65', give the formula $FeAsO_4.Fe(OH)SO_4.5H_2O$, analogous to that of destinezite.

L. J. S.

Villiers (J. E. de). *Columbomicrolite from Eshowe, Natal.* Amer. Min., 1941, vol. 26, pp. 501–506.

Minute (0·05 mm.) crystals forming small aggregates in albitite are colourless and transparent, optically isotropic, and have d 4·16, n 2·152. Analysis by C. F. J. van der Walt, after deducting 36·9 % zircon, gave Nb_2O_5 71·2, Ta_2O_5 nil, TiO_2 1·8, Ce_2O_3 nil, Fe_2O_3 trace, CaO 15·2, Na_2O 10·0, H_2O 1·8 = 100·0, agreeing with $(Ca,Na)_2(Nb,Ti)_2(O,OH)_7$. A review is given of the several minerals of the pyrochlore group. Microlite containing much uranium is named tantalohatchettolite.

L. J. S.

Meteorites and Tektites.

Foshag (W. F.). *Problems in the study of meteorites.* (Presidential address.) Amer. Min., 1941, vol. 26, pp. 137–144.

A general review of the structure and component minerals of meteorites. It is suggested that in stony meteorites the particles of nickel-iron are a later introduction [M.A. **8**–60]. Achondrites are compared with terrestrial rocks. Meteorites in general are compared with basic rocks that have crystallized from molten material in which water was absent and oxygen deficient. Siderites and pallasites must have cooled very slowly, while in aerolites the cooling was rapid; and there is evidence of later disturbances and thermal metamorphism. They perhaps came from the destruction of a missing planet. L. J. S.

Wylie (C. C.). *Common errors in meteoric astronomy.* The Sky, Amer. Mus. Nat. Hist., 1941, vol. 5, no. 11, p. 7, no. 12, pp. 8, 15, 2 figs.

The temperature of a meteoroid [M.A. **7**–265] is usually assumed to be near absolute zero, but from the sun's heat it will be near 0° C. when approaching the earth. Detonations are shock waves in the air caused by a body travelling faster than the velocity of sound, rather

than from the crushing and shattering of the body by air pressure. The explosive energy producing meteorite craters is supplied by the vaporization of iron and rock, rather than the compression of air in front of the moving body or the presence of water in the rocks. L. J. S.

LEONARD (Frederick C.). *The need for an institution for research on meteorites.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, pp. 329–331.

An endowment is appealed for. L. J. S.

LEONARD (Frederick C.). *A numerical designation for meteoritic falls.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, pp. 214–215.

A seven-digit number embodying the latitude and longitude of the place of fall is suggested. L. J. S.

LEONARD (Frederick C.) & SLANIN (Boris). *A statistical study of the meteoritic falls of the world.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, pp. 151–159.

—— —— *Statistical studies of the meteoritic falls of the world. 2. Their areal concentration.* Ibid., pp. 206–214.

The numbers of stones, stony-irons, and siderites observed to fall and found are tabulated for each of the states of U.S.A., for other countries, and for the continents. Of the 1388 known meteorites 634 were observed falls; of these 499 (observed falls 93) are from U.S.A. Similar tables show the numbers per 10,000 square miles ('concentration index') and the distance between adjacent falls assuming the distribution to be uniform. The numbers recorded depend largely on the density of the human population [except in China]. L. J. S.

NICHOLS (H. W.). *Twelfth meteoritic fall known to have damaged a building.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, p. 216.

Correction to a previous note [M.A. **8**–55], adding Strathmore (Perthshire, fell December 3, 1917). L. J. S.

BUDDHUE (John Davis). *The luminescence of meteorites.* Amer. Journ. Sci., 1941, vol. 239, pp. 839–844.

Most of the 22 stony meteorites tested in a vacuum tube with electric

discharge were luminescent, often followed by a short duration of phosphorescence. They showed no effect in ultra-violet rays and X-rays. The glow is usually bluish, but two howardites gave a yellow glow, and two other stones showed red spots. Roasting in air changed the glow of one stone to green. Olivine is inactive, and the glow comes from the enstatite. Besides cathode rays, ions are also present in this spectrum tube, and the luminescence is called ionoluminescence rather than cathodoluminescence. This may perhaps have some relation to the violet type of continuous spectrum of comets. [M.A. **8**–56.]

L. J. S.

La Paz (Lincoln). *A mathematical formula for meteoritic age-determination and its application to the Pultusk, Poland, meteorites.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, pp. 261–265.

The age of 5×10^8 years for the Pultusk meteorite deduced from the helium ratio by F. A. Paneth (1932) appears to be a low estimate; but calculations of the rate of accretion of cosmic particles according to the theory of A. Corlin [M.A. **7**–171, 371] leads to very nearly the same value.

L. J. S.

Schumb (W. C.), Evans (R. D.), & Leaders (W. M.). *Radioactive determination of the relative abundance of the isotope K^{40} in terrestrial and meteoritic potassium.* Journ. Amer. Chem. Soc., 1941, vol. 63, pp. 1203–1205, 3 figs.

The β-activity of KCl separated from the Pultusk meteorite shows no difference from a terrestrial sample, indicating no difference in age. [M.A. **7**–277, 539; **8**–156.]

L. J. S.

[Chirvinsky (P. N.)] Чирвинский (П. Н.). Главные закономерности в составе крупинчатых метеоритов (хондритов). [*Main principles in the composition of granular meteorites (chondrites).*] Зап. Весросс. Мин. Общ. (Mém. Soc. Russe Min.), 1939, vol. 68, pp. 580–589.

[Kulik (L. A.)] Кулик (Л. А.). Замечания к статье П. Н. Чирвинского «Главные закономерности в составе крупинчатых метеоритов (хондритов)». [*Remarks on the article of P. N. Chirvinsky. . . .*] Ibid., 1940, vol. 69, pp. 570–571.

Y. I. Simashko and P. N. Chirvinsky have applied the term 'granular meteorites' to chondritic stones. L. A. Kulik points out that achondrites are also granular in structure, and that the Russian words

крупинка and крупа are applied only to cereal grains, not to spherical grains. S. I. T.

Marsh (J. S.). *The alloys of iron and nickel.* Vol. I—*Special-purpose alloys.* Alloys of Iron Research, Monograph Series, New York and London (The Engineering Foundation; McGraw-Hill Book Co.), 1938, xii+593 pp., 290 figs.

The Fe–Ni and Fe–C–Ni diagrams and the various physical properties of the alloys are dealt with. Brief reference is made to meteoritic iron. Plessite is not a eutectoid, but a mixture of the α and γ (kamacite and taenite) phases. Vol. 2, in preparation, will deal with steels and cast-irons. L. J. S.

Henderson (E. P.). *Methods of determining nickel and cobalt in meteoric iron.* Amer. Journ. Sci., 1941, vol. 239, pp. 372–378.

Different chemical analyses of the same siderite mass have shown considerable variation, and the earlier analyses are not reliable. In selecting material for analysis it is suggested that a thin slice should be etched and examined to ensure that it is a typical sample. Gravimetric determination of iron always gives high results, and this should be estimated volumetrically. Repeated precipitation of iron with weak ammonia takes down some nickel; better results were obtained with strong ammonia, or by the addition of tartaric acid to prevent the precipitation of iron; nickel is then estimated with dimethylglyoxime. Cobalt is not so completely separated from iron as is nickel by strong ammonia: it is then precipitated as sulphide and weighed as oxide. Determinations of nickel by the different methods are compared for several sideries; e.g. for Iquique, Ni 16·007 % using strong ammonia, 15·91 % with tartaric acid, and 11·70 % with weak ammonia.

L. J. S.

Nininger (H. H.). *Contraterrene (?) meteorites.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, pp. 215–216.

La Paz (Lincoln). *Contraterrene meteorites.* Ibid., pp. 265–267.

Criticism of a previous note [M.A. 8–62]. Lack of sufficient observations need not give place to speculative hypotheses. Reply to discussion.

L. J. S.

Wylie (C. C.). *Note on contraterrene meteorites.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, pp. 381–383.

A hypothetical contraterrene meteorite on encountering terrene

matter (air) in the upper atmosphere would develop sufficient energy to blow it to pieces. [M.A. **8**–62.] L. J. S.

Hadding (Assar). *Der Lundsgård-Meteorit.* Geol. För. Förh. Stockholm, 1941, vol. 62 (for 1940), pp. 397–407, 10 figs.

A stone of 10·5 kg. was heard to fall in the evening of April 3, 1889, at Lundsgård in Källna parish, Skåne (56° 13′ N., 13° 2′ E.), and was found a few days later lying outside a hole 30 cm. deep. The present weight is 8·87 kg. It is a grey, somewhat brecciated chondrite with a few black veins, and consists of olivine, enstatite, few grains of diopside, plagioclase, troilite, nickel-iron, and glass. A new analysis by S. Palmqvist gave SiO_2 38·23, TiO_2 0·19, Al_2O_3 2·42, Cr_2O_3 0·49, Fe_2O_3 1·50, FeO 20·05, NiO —, MnO 0·27, MgO 24·29, CaO 2·43, Na_2O 1·42, K_2O 0·38, P_2O_5 0·28, H_2O+ 0·10, H_2O- 0·07, S 2·45, Cl —, Fe 5·95, Ni 1·02 = 101·54, total (less O for S) 100·32. L. J. S.

[Onosovskaya (A. A.)] Onossovskaya (A. A.) Оносовская (А. А.). *Description of the «Bolshaya Korta» meteorite.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 28, pp. 122–123.

This stone [no information given of locality, date, or weight] has the shape of an irregular tetrahedron with rounded corners. The iron-black crust (< 1 mm. thick) has a pimply surface. Thin sections show crushed grains (0·01–0·05, rarely 0·1–0·3 mm.) of olivine and plagioclase. Euhedral particles of olivine are sometimes enclosed in the plagioclase. Polished sections in polarized light show about 10 % of troilite and nickel-iron. L. J. S.

Kulik (L. A.) Кулик (Л. А.). *The meteorite expedition to Podkamennaya Tunguska in 1939.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 28, pp. 596–600, 4 figs.

A surveying party in 1939 supplemented the unsatisfactory aerial photographs taken in 1938. Fallen trees radiate from two centres in the southern swamp. Borings show a disturbance of the ground. [M.A. **7**–374, **8**–58.] L. J. S.

Millman (Peter M.). *The Dresden meteorite.* Publications Amer. Astron. Soc., 1940, vol. 10, pp. 23–24 (abstract).

A very brilliant meteor was observed at 20.49 (E.S.T.) on July 11, 1939, over southern Ontario and Michigan, first appearing at a height

of 150 miles, becoming intensely blue towards the end of its path, and bursting at heights of 45, 20, and 6 miles. Estimates of the velocity give a strongly hyperbolic orbit about the sun. Three grey chondrites were recovered at 42° 31·2′ N., 82° 15·6′ W., a few miles south of Dresden, Ontario. [M.A. 7–543.] L. J. S.

Preston (F. W.), Henderson (E. P.), & Randolph (James R.). *The Chicora (Butler County, Pa.) meteorite.* Proc. U.S. Nat. Mus., 1941, vol. 90, pp. 387–416, 6 pls., 1 text-fig.

At 6 p.m. (eastern standard time) on June 24, 1938, a fireball was seen and noises heard over western Pennsylvania; and two small stones (242 and 61 grams) were found at Chicora (40° 56′ N., 79° 44′ W.), some miles short of the calculated point of impact of the main mass which was not found. An interesting account is given of the observations of many of the inhabitants. From energy considerations and the size of the smoke trail the mass of the meteor is calculated as 519 tons. The meteorite is classed as an olivine-hypersthene-chondrite of the Soka Banja type, and consists of olivine (α 1·695, β 1·712, γ 1·735, FeO:MgO = 1:2·33) 54·55 %, hypersthene (of two kinds: α 1·685, β 1·695, γ 1·699, 2V 50–55°; α 1·681, β 1·690, γ 1·695, 2V 70°; FeO:MgO = 1:2·4) 28·84, oligoclase (α 1·535, β 1·539, γ 1·544, $Ab_{80}An_{20}$) 7·20, troilite 6·26, schreibersite? 0·53, nickel-iron (Ni:Fe = 1:2·68) 2·65, total 100·03. These percentages are calculated from the mean of analyses of the finer and coarser sifted material (including metal) soluble and insoluble in HNO_3+HCl, with appreciable differences for the finer and coarser grades. L. J. S.

Nininger (H. H.). *Free copper in a new aërolite from Garnett, Kansas.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, pp. 326–329, 1 fig.

A much weathered stone weighing 4788 grams was ploughed up in 1937 near Garnett in Anderson Co., Kansas [38° 17′ N., 95° 16′ W.]. Sections show a greenish-black matrix consisting almost entirely of olivine chondrules, with minute grains of nickel-iron and troilite and veins of red, brown, and black material. A small troilite nodule consists in part of metallic copper showing over an area 2·0×0·12 mm.; and minute specks of copper were seen in other parts of the stone. In only one of more than a hundred slices of Toluca (Xiquipilco) siderite small grains of metallic copper are associated with nodules of graphite, troilite, and schreibersite. Native copper has been previously recorded in the

Richardson stone [M.A. **1**–101] and in the Toluca siderite [M.A. **7**–64]. Analysis by F. G. Hawley of 'the Garnett meteorite' [? non-magnetic portion] gave: SiO_2 39·46, TiO_2 0·11, Al_2O_3 2·30, Cr_2O_3 0·55, Fe_2O_3 3·58, FeO 17·94, MnO 0·39, NiO 1·42, CoO 0·11, CuO 0·09, MgO 25·31, CaO 1·96, alkalis 1·05, P_2O_5 0·31, FeS 5·06, [= 99·64]; and of the magnetic portion (10·1 %) Fe 86·21, Ni 6·54, Co 0·38, Cu 0·12, insol. 7·00, [= 100·25]. L. J. S.

Fouts (F. F.) & King (J. J.). *The Kendleton, Texas, meteorite fall of May 2, 1939.* Univ. Texas Publ. 1940, no. 3945, pp. 657–664, 1 pl., 2 text-figs.

At 7.25 p.m. C.S.T. a fireball was seen travelling from NNW. to SSE. over SE. Texas. The height of appearance was 80 miles, and the end-point, where it exploded, 16 miles over Kendleton [29° 23′ N., 90° 59′ W.] in Fort Bend Co. [M.A. **7**–378]. The luminous path of 95 miles was traversed in slightly over 3 seconds. Two loud explosions and a terrific roar were heard. At first brilliant white, the fireball was reddish when it exploded, red particles flying in all directions. As it approached Kendleton it 'seemed twice as big as the moon', and at Houston (48 miles to the east) the luminous disk appeared to subtend an angle equal to that of the full moon. A yellowish cloud trail (photographs given) persisted for 5 minutes. Stones were heard to fall and were found over an area of about 4 square miles around Kendleton. The largest (1588 grams) fell on hard dry ground and was not completely buried; green grass was not singed. Other stones weigh 1 lb. 12 oz. and less than 1 lb. Secondary fractures were shown on two of these stones. The meteorite consists of silicates and nickel-iron. L. J. S.

Leonard (Frederick C.). *Small aërolites recovered from the site of the Holbrook, Arizona, fall of 1912.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, pp. 384–387.

Eight small meteoritic stones separated with a magnet from the gravel of ant hills weighed 0·0074–0·0628 gram and had maximum diameters 1·8–4·8 mm. Most of them are complete crusted stones. L. J. S.

Nininger (H. H.). *Collecting small meteoritic particles.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, pp. 159–162.

In April 1940 on the site of the Holbrook (Arizona) meteorite shower of July 19, 1912, three small meteoritic stones were found in ant hills with the aid of a magnetic rake. They are complete

crusted stones measuring 2–4·8 mm. with a total weight of 0·0948 gram (the smallest 0·0183 gram). This suggests that a rain of small particles ('meteoritic gravel') accompanies a shower. The clouds produced by the flight of a fireball must consist of fine dust in considerable amount. L. J. S.

Whitney (Walter T.). *A recently discovered aërolite from Rosamond Dry Lake, California.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, p. 387 (abstract).

A stone of 820 grams was found in 1940 on the surface of Rosamond Dry Lake in Kern County. It is a chondritic stone with nickel-iron, and is very similar to the stones found in 1936 at Murdoc Dry Lake (15 miles NE.) [M.A. **7**–69]. L. J. S.

Henderson (E. P.). *Corrections to published analyses of meteorites.* Amer. Journ. Sci., 1941, vol. 239, pp. 407–411.

New analyses are given of the following siderites showing higher nickel values in better agreement with the types of structure. I, Glorieta Mountain, New Mexico, 'Santa Fe' mass, medium [? fine] octahedrite [M.A. **6**–14, **7**–544]. II, Grant, New Mexico [M.A. **6**–14]. III, Mount Joy, Pennsylvania, hexahedrite or coarsest octahedrite. IV, Sandia Mountain New Mexico, hexahedrite or coarsest octahedrite [M.A. **4**–263]. V, Coahuila, Mexico, hexahedrite. VI, Iquique, Peru [i.e. Chile], nickel-rich ataxite.

	Fe.	Ni.	Co.	P.	S.	Insol.	Total.	Previous Ni determinations.
I.	87·06	11·79	0·42	0·37	trace	0·01	99·65	4·64–11·15
II.	88·63	9·35	0·63	0·57	0·03	—	99·21	8·58
III.	92·93	5·79	0·61	—	—	—	99·33	4·81
IV.	92·46	5·92	0·53	0·68	trace	0·07	99·66	5·75
V.	93·59	5·59	0·78	0·32	trace	0·07	100·35	2·10–7·42
VI.	83·47	15·99	0·32	0·09	trace	0·005	99·875	12·27–15·23

Henderson (Edward P.). *Chilean hexahedrites and the composition of all hexahedrites.* Amer. Min., 1941, vol. 26, pp. 546–550.

Analyses of the new Chilean hexahedrites [M.A. **7**–545] are now given:

	Fe.	Ni.	Co.	Cr.	P.	S.	Insol.	Total.
Coya Norte...	93·74	5·51	0·37	0·03	0·30	trace	0·03	'99·95'
Negrillos ...	93·94	5·32	0·35	0·02	0·22	trace	0·02	99·87
Puripica ...	93·83	5·77	0·26	trace	0·19	trace	0·03	100·08
Rio Loa ...	93·33	5·70	n.d.	trace	0·28	trace	0·01	99·32
Sierra Gorda	93·44	5·58	0·25	trace	0·23	trace	0·01	99·51
Filomena ...	n.d.	5·73	0·21	—	0·30	trace	0·01	—

A new determination of Ni in Union [M.A. **7**–70] gave 5·63 %. In all of these Fe averages 93·50 and Ni 5·60 %. They were all reported from a narrow strip of country 21° 26′–23° 0′ S., 69° 26′–70° 5′ W. Mejillones [M.A. **3**–95], Cerros del Buey Muerto [= Tocopilla, M.A. **5**–300], and Union are all in the same area; and San Martin [M.A. **6**–11] at 30° 0′ S., 71° 18′ W. It is probable that all these really belong to the same fall, and they are referred to collectively as 'North Chilean' hexahedrites. Analyses of 16 hexahedrites from other localities are tabulated, including new analyses of Coahuila, Mexico (Fe 93·59, Ni 5·59, Co 0·78, P 0·32, S trace, insol. 0·07), and Boguslavka, Siberia (Fe 94·05, Ni 5·48), and show Fe 93·06–94·14 (mean 93·65), Ni 5·21–5·79 (mean 5·52). This is close to the average (Fe 93·35, Ni 6·07) of eleven kamacite analyses. Hexahedrites and kamacite fall near the α–$\alpha\gamma$ boundary of Owen and Sully's diagram [M.A. **7**–384], which shows a maximum solubility of 5·6 % Ni in Fe at about 400° C. L. J. S.

Meen (V. B.). *The composition of the Maria Elena meteorite.* Amer. Journ. Sci., 1941, vol. 239, p. 412.

A new analysis of this siderite from Chile [M.A. **7**–273] gave Fe 91·93, Ni 7·63, Co 0·11, Cu trace, P 0·09, S 0·35, C nil, Pt &c. nil, total 100·11. This percentage of nickel is more in keeping with the type of structure (now stated to be that of a medium octahedrite) than the value (4·76 %) previously given. L. J. S.

Hodge-Smith (T.) & Edwards (A. B.). *The Tawallah Valley meteorite.* Rec. Australian Museum, 1941, vol. 21, pp. 1–8, 2 pls., 2 text-figs.

A siderite weighing 75·75 kg. (167 lb.) was found in 1939 at Tawallah Valley (15° 42′ S., 135° 40′ E.), 48 miles NW. of Borroloola in Northern Territory, Australia. It has the form of a rectangular slab 65 × 38 cm., with a thickness of 65 mm. at the head, gradually decreasing to 5 mm. at the tail, and without any prominent surface markings. According to the analysis, Fe 82·29, Ni 16·90, Co 1·09, Pt 0·003, S nil, P nil, C 0·03, total 100·313, sp. gr. 8·00, Fe:Ni 4·8, it belongs to the nickel-rich ataxites; but as it shows a fine micro-structure representing the early stage of the octahedral structure, the term eotaxite is suggested. The few small blebs of iron sulphide are of two kinds: troilite, which effervesces with dilute HNO_3; and pyrrhotine which is scarcely attacked. A prismatic crystal of pyrrhotine left on dissolving the nickel-iron in dilute HNO_3 shows the forms *csm* (*cs* 45°). The etched surface of the nickel-iron shows a schiller effect in oblique illumination, and under

high magnification short kamacite bars in three directions set in a plessite ($\alpha+\gamma$ Ni-Fe) groundmass. Two kinds of taenite are distinguished: minute blebs often enclosed in kamacite; and bands bordering the kamacite. From a consideration of the Fe-Ni equilibrium diagram, the former kind of taenite is richer in nickel. The Brinell hardness of the iron ranges at different points from 229 to 255, corresponding to a tensile strength of 50·4–56·1 tons per square inch. L. J. S.

Stillwell (F. L.). *The Caroline stony meteorite.* Mem. Nat. Mus. Melbourne, 1941, no. 12, pp. 41–47, 1 pl.

A stone resembling ironstone was picked up on the site of a blackfellows' camp 4 miles north of Caroline [38° S., 140° 55′ E., in the SE. corner of South Australia]. It is much weathered, weighs 800 grams, sp. gr. 3·40, and is classed as a veined bronzite-olivine-chondrite. Descriptions are given of thin sections and of polished surfaces. Numerous chondrules of various types are embedded in a crystalline matrix of olivine, bronzite, and clinobronzite, with grains of nickel-iron, pyrrhotine (rather than troilite), and chromite, and interstitial merrillite. Trevorite ($NiO.Fe_2O_3$) is present in veins of secondary limonite.

L. J. S.

Baker (George) & Edwards (A. B.). *The Bond Springs stony meteorite.* Mem. Nat. Mus. Melbourne, 1941, no. 12, pp. 49–58, 1 pl., 4 text-figs.

A small complete stone, weighing 6·18 grams, was found before 1898 near Bond Springs (23° 30′ S., 133° 50′ E.), 15 miles from Alice Springs in Central Australia. It is an enstatite-olivine-chondrite with numerous minute (0·2–0·8 mm.) chondrules of various types and small porphyritic crystals in a fine-grained matrix. Micrometric analysis showed silicates 77·9, nickel-iron 17·3, pyrrhotine 4·7, chromite 0·1 weight %. The action of different reagents on polished surfaces is stated for the kamacite, taenite, and an undetermined Ni-Fe occurring as irregular lamellae in kamacite. The iron sulphide is not attacked by HNO_3 or HCl, and is therefore believed to be pyrrhotine rather than troilite. The iron sulphide in the Henbury siderite is attacked by acids and is referred to troilite. L. J. S.

Tombaugh (Clyde W.). *Meteorites in their bearing on the origin of the surface features of the moon.* Popular Astronomy, Northfield, Minnesota, 1941, vol. 49, pp. 387–388 (abstract).

Both volcanic and meteoritic agencies are believed to have played

a part in the formation of the various features—maria, plains, craters, &c. [M.A. **7**–76, 77, 274, 380; **8**–62.] L. J. S.

Fenner (Charles). *Australites, part IV—The John Kennett collection with notes on Darwin glass, bediasites, etc.* Trans. Roy. Soc. South Australia, 1940, vol. 64, pp. 305–324, 1 pl., 1 text-fig. [M.A. **7**–276.]

An analysis is given of the shapes and sizes of 7184 australites collected around Charlotte Waters in Central Australia. The average weight is just over 6 grams (range 2–39 grams), which is seven times the average for specimens in the Shaw collection [M.A. **6**–18] from the Nullarbor Plain several hundred miles to the SW. A classification of the shapes of fragments of Darwin glass from Tasmania is attempted. Chemical analyses are given of the glass from the burning of straw stacks (SiO_2 57·40, K_2O 13·58 % &c.). Tektites from Texas [M.A. **8**–62] are mentioned. L. J. S.

Growth and Corrosion of Crystals.

Barillet (F.) & Choisnard (A.). *Observations relatives à la loi de Curie. Règle d'accroissement des cristaux en présence de substances tensio-actives.* Bull. Soc. Franç. Min., 1938, vol. 61, pp. 297–303, 2 figs.

Combining the expressions for crystal growth due to Curie and Valeton leads to the hypothesis that the surface tension between the crystal surface and mother-liquor is dependent upon the degree of supersaturation. Experiments on the partition of various salts such as ammonium chloride between saturated aqueous solution of the salt and oleic acid show that the passage from under-saturation to supersaturation is accompanied by an increase of surface tension at the crystal-solution interface. The presence of a tensio-active substance, i.e. one which in small concentrations alters the habit of crystal growth, produces a constant retardation of growth for a given face whatever the coefficient of supersaturation. F. A. B.

Spangenberg (Kurt). *Zur Persistenz der Feinausbildung der Flächen von NaCl-Wachstumskörpern.* I. Mitteilung. Nitschmann (Günter). *Substanzanlagerung und Übersättigung bei verschiedenen Stadien von NaCl-Wachstumskörpern.* Zeits. Krist., 1940, vol. 102, pp. 285–308. II. Mitteilung. Spangenberg (Kurt) & Nitschmann (Günter). *Die morphologische Entwicklung der Flächen von NaCl-Wachstumskörpern des Typus I bei hoher Übersättigung.* Ibid., pp. 309–344, 23 figs.

The dependence of the degree of supersaturation of the mother-liquor

out of which crystals of rock-salt are growing on the existence or non-existence of vicinal faces is discussed in detail. H. S.

Spangenberg (K.). *Unwirksamer Übersättigungsbereich und angebliche Abhängigkeit der Sättigungskonzentration vom Realkristallbau des Bodenkörpers.* Zeits. Krist., 1940, vol. 102, pp. 345–348.

A discussion of papers by Balarew and Kolarow [M.A. **6**–46, 468], Valeton [M.A. **2**–326], Spangenberg and Nitschmann [preceding abstract] on the differences of solubility of gypsum and rock-salt obtained when the point of saturation is found by raising or lowering the temperature. H. S.

Nowacki (W.). *Bemerkungen zu der Arbeit von A. P. Honess und J. R. Jones: "Etch figure investigations with optically active solvents."* Zeits. Krist., 1940, vol. 102, pp. 217–218.

A criticism of the conclusions drawn by Honess and Jones (Bull. Amer. Geol. Soc., 1937, vol. 48, p. 667) from their experiments on etched figures of calcite, with references to former work on the same subject. H. S.

France (Wesley G.) & Wolfe (Kathryn M.). *Adsorption at crystal–solution interfaces. XII. A study of the adsorption of isomeric dyes by crystals of cupric acetate during their growth from solution.* Journ. Amer. Chem. Soc., 1941, vol. 63, pp. 1505–1507, 1 fig.

Meta- and *para*-sulphonated aniline promote the formation of ortho-dome faces, while aniline and *ortho*-sulphonated aniline promote stair-step growth on crystals of cupric acetate. L. J. S.

Preston (Eric). *Crystallisation in silicate slags and glasses.* Trans. Faraday Soc. London, 1941, vol. 37, pp. 209–220, 18 figs.

Curves and an empirical equation show the relation between the rate of growth of crystals of devitrite ($Na_2O.3CaO.6SiO_2$) and temperature and viscosity in a melt of sheet-glass. L. J. S.

Hedvall (J. A.). *Reactions between substances in solid state, with special regard to systems containing silica.* Proc. Symposium on the Chemistry of Cements, Stockholm, 1938, pp. 42–58, 13 figs.

A summary of recent work with bibliography. Reactions between substances in the solid state proceed more rapidly within temperature intervals in which one or more components have their transition points.

The influence of foreign substances in the lattice and of surface conditions, particularly crystal form, is also considered. F. A. B.

Frondel (Clifford). *Oriented inclusions of staurolite, zircon and garnet in muscovite. Skating crystals and their significance.* Amer. Min., 1940, vol. 25, pp. 69–87, 17 figs.

The position of flattened staurolite, zircon, and garnet inclusions in muscovite from Manhattan schists have been plotted relative to the cleavage plane and the [100] axis of the host. It is concluded from a large number of observations that the inclusions are distributed in preferred orientations which occur at crystallographic positions in which directions of relatively low index in the planes of contact of the inclusions and the muscovite coincide, but no corresponding simple structural relation has been discovered. It is claimed that the inclusions have been deposited upon the (001) face of muscovite and have 'skated' about before burial by continued mica growth. The preferred orientations mark final resting positions of relatively low interfacial energy. X-ray measurements for the staurolite inclusions are *a* 7·84, *b* 16·56, *c* 5·64 Å., and for garnet *a* 11·585 Å. No X-ray measurements are given for the zircons, which are altered. F. A. B.

Frondel (Clifford). *Effect of dyes on the crystal habit and optics of NaF, LiF, NaCl, KCl, KBr and KI.* Amer. Min., 1940, vol. 25, pp. 91–110, 3 figs. Correction, p. 314.

Only a few of the dyes employed are absorbed on (111) and modify the ordinary cubic habit to octahedral. There is a marked tendency for dyes to induce skeletal growth of NaF and LiF, but not of the other salts. A description is given of the pleochroism and birefringence of some of the products. Neither the theory of H. E. Buckley [M.A. **5**–261, **6**–109, **7**–531] nor of W. G. France appears to fit the facts. F. A. B.

Frondel (Clifford). *Crystal habit variation in sodium fluoride.* Amer. Min., 1940, vol. 25, pp. 338–356, 9 figs.

The modification of habit of NaF crystals by a large number of inorganic and organic substances other than dyes has been studied. Those substances which, like the alkali hydroxides and carbonates, yield free hydroxyl ions in solution are the most effective in promoting habit change. As the OH' concentration in solution increases, the NaF crystals change in form through the sequence: cubes, skeletal cubes, skeletal octahedra, octahedra. At still higher concentrations (e.g. of Na_2CO_3)

a habit reversal from octahedra to cubes takes place. These changes are related to the substitution of an OH' ion for an F' ion in the growing face of a NaF crystal. Substances like Na_3PO_4 and Na_2SO_4, which form double salts with NaF, also modify the habit to octahedral. [M.A. 5-492.] F. A. B.

Frondel (Clifford). *Exsolution growths of zincite in manganosite and of manganosite in periclase.* Amer. Min., 1940, vol. 25, pp. 534–538, 2 figs.

Octahedral partings of manganosite (rock-salt structure) from Franklin Furnace, New Jersey, are covered by a film of zincite (wurtzite structure) up to 0·25 mm. thick. The films of zincite are single crystals with (0001) [$10\bar{1}0$] parallel to manganosite (111) [011]. It is shown how the crystal-structures of the two minerals limit overgrowth to the observed orientation. Cleavage fragments of periclase from Långban and Nordmark, Sweden, contain swarms of minute octahedra of manganosite oriented so that (111) [011] of each are parallel. Since both minerals have the same crystal-structure and similar lattice dimensions the habit of the exsolution mineral is not limited as in the preceding case.

F. A. B.

Howey (J. H.). *The noncubic growth of single crystals of silver by condensation from vapor.* Physical Rev. (Amer. Phys. Soc.), 1939, ser. 2, vol. 55, pp. 578–581, 2 figs.

Under certain conditions of growth (described), silver was deposited from the vapour as needle crystals elongated along [110], but without crystal facets. A possible cause of this type of growth is suggested.

M. H. H.

Bryan (W. H.). *Spherulites and allied structures. Part 1.* Proc. Roy. Soc. Queensland, 1941, vol. 52, pp. 41–53, 3 pls., 8 text-figs.

A description of simple and composite spherulitic growths, ranging from microscopic size to over 3 feet in diameter, from SE. Queensland. Some show a concentric as well as a radial structure. L. J. S.

Howard (Arthur David). *Zoning in spherulites.* Amer. Min., 1940, vol. 25, pp. 614–618, 4 figs.

Multiple zoning in artificial spherulites of menthol is described and similar zoning in spherulitic rhyolites is compared and discussed.

F. A. B.

Huff (Lyman C.). *Artificial helictites and gypsum flowers.* Journ. Geol. Chicago, 1940, vol. 48, pp. 641–659, 10 figs.

Helictites (ἕλιξ, spiral) are crooked and branching formations in limestone caves, as distinct from the straight stalactites and stalagmites. They may be either calcite or aragonite. One of aragonite from Kentucky was found to contain some sulphate (present also in the ground water), which no doubt influenced the growth of aragonite rather than calcite. Helictites of soluble salts (sodium thiosulphate, potassium dichromate, $CaCl_2$, and $CuSO_4$) were grown artificially from $\frac{1}{4}$-inch glass tubes with a porous cork at the lower end and preferably with an arrangement for varying the hydrostatic pressure. When the flow is sufficient to form a drop a straight 'straw' stalactite results; but with a slower flow under some hydrostatic pressure crooked and branching tubes are formed. The flow of liquid is inside the tube, and growth takes place at the free end. Irregularity of form is due to the chance sideways growth of crystals. Rosettes of sodium thiosulphate, similar to gypsum 'flowers', were produced with a solution percolating under slight pressure through a porous plate. Here growth is from the fixed end, fibres being pushed outwards. L. J. S.

Prider (Rex T.). *An unusual occurrence of gypsum at Kalgoorlie, Western Australia.* Amer. Min., 1940, vol. 25, pp. 591–605, 5 figs.

When two of the gold mines were unwatered, after flooding for about 30 years, encrustations of gypsum were found on the walls and roof of airlocked levels. The encrustation, up to 4 inches thick, consists of 'swallow-tail' twins 1–$3\frac{1}{2}$ in. long. Below the iron-stained lines marking the old water level there is only a thin irregular crust of minute crystals. Various alternative suggestions are made to account for this formation. The most probable seems to be that the crystals grew during the release of pressure (20 atmospheres) while the mines were being unwatered (gypsum having a greater solubility under pressure). The mine water contains 0·1878 % $CaSO_4$. L. J. S.

Yamamoto (Mikio). *On light figures in single crystals of nickel and copper.* Sci. Rep. Tôhoku Univ., Ser. 1, 1940, vol. 29, pp. 113–131, 50 figs.

Single crystals grown by slow solidification in a porcelain tube were etched with aqueous solutions of various acids or salts, for the purpose of determining the orientation of the crystals. A beam of light reflected from the etched surface of the crystal was projected on a screen. The

light-figures from (100), (111), and (110) are symmetrical, but vary in form with the etching reagent, its temperature, and the time of etching.

L. J. S.

Newhouse (W. H.). *The direction of flow of mineralizing solutions.* Econ. Geol., 1941, vol. 36, pp. 612–629, 8 figs.

The arrangement of zones, linear structures, malformations, encrustations, and corrosion effects on natural and artificial crystals indicate the direction of movement of mineralizing solutions. M. A. P.

Physical Properties.

Dane (E. B., *Jr.*). *Densities of molten rocks and minerals.* Amer. Journ. Sci., 1941, vol. 239, pp. 809–818, 2 figs.

Determinations were made by weighing a platinum bob immersed in melts of which the viscosity was not too high. Preliminary tests of the method gave: for NaCl d 1·495 at 900° C., 1·400 at 1100° C.; for B_2O_3 d 1·516 at 1000° C. The following results were obtained (1, d of crystal at 20° C.; 2, d of glass at 20° C.; 3, melting-point; 4, computed d of crystal at m.p.; 5, d of glass at m.p.; 6, volumetric thermal expansion of glass at m.p. $\times 10^{-6}$; 7, surface tension of glass in dynes per cm.).

	1.	2.	3.	4.	5.	6.	7.
Bytownite (Norway)	2·71	2·61	1480°	2·63	2·52	56	220
Åkermanite (artificial)	2·94	2·95	1458	—	2·724	56	360
Diopside (artificial)	3·265	2·846	1391	3·14	2·67	64	280
Diabase (Maine)	2·97	2·78	(1250)	2·89	2·64	38	345

L. J. S.

Switzer (George). *Hardness of micaceous minerals.* Amer. Journ. Sci., 1941, vol. 239, p. 316.

Text-books give the hardness of micas and chlorites as 2–3. This value applies only to the basal plane (001), and is stated by the author as $2\frac{1}{2}$. In a direction perpendicular to (001) he finds the value 4. For clintonite $3\frac{1}{2}$ on (001) and 6 $\perp$ (001). L. J. S.

Koifman (M. I.) Койфман (М. И.). *Mechanical strength of mineral particles of high hardness.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 29, pp. 478–479, 2 figs.

The following average values are given of the resistance to crushing of grains: quartz 2800, natural corundum 6000, artificial corundum 10,000, silicon carbide 18,600 kg/cm.^{2} Smaller grains have a greater crushing strength. L. J. S.

Kantola (Martti). *Eine Methode zur Bestimmung der Elastizitätskonstanten der Kristalle durch Druckversuche und ihre Anwendung bei NaCl-Kristallen.* Acta Soc. Sci. Fennicae, 1939, new ser. A., vol. 3, no. 1, 61 pp., 9 figs.

A modified form of Dowling's ultramicrometer is described which can detect changes in the length of a crystal when compressed linearly accurate to 1×10^{-7} cm. The decrease in length of a prism of rock-salt when compressed by 5 kg. per sq. cm. parallel to [100] is measured by distributing the decrease between three symmetrically attached parallel plate condensers. The change in capacity of each condenser is measured by the change in anode current of a triode in an oscillation circuit. The reciprocal of Young's modulus determined for three rock-salt prisms of different lengths is $2{\cdot}15 \pm 0{\cdot}03 \times 10^{-12}$ cm.^{2}/dyne. F. A. B.

Günther (Fritz). *Über eine Methode zur Bestimmung der elastischen Konstanten von Einzelkristallen mittels Röntgenstrahlen.* Zeits. Krist., 1941, vol. 103, pp. 230–273, 22 figs.

An apparatus is described for bending or pulling a single crystal of aluminium of known orientation. X-ray back reflections at high angles from the crystal are received on a conical film and the changes due to stress measured with a photometer. The elastic moduli are calculated from changes in the lattice spacing in three different directions. A study is also made of the intensity changes in the neighbourhood of all the observed reflections. F. A. B.

Atanasoff (John V.) & Hart (Philip J.). *Dynamical determination of the elastic constants and their temperature coefficients for quartz.* Physical Rev. (Amer. Phys. Soc.), 1941, vol. 59, pp. 85–96, 14 figs.

Plates of quartz free from twinning and of known orientation were made to vibrate piezoelectrically and frequencies of higher order harmonics of the plates were determined to an absolute accuracy of 1 part in 25,000. The authors develop the mathematical theory in detail and utilize their expressions to derive the elastic constants and temperature coefficients from their frequency measurements carried out up to and beyond the critical temperature of quartz. A small discrepancy between the results obtained and the classical theory of elasticity is difficult to explain on any other basis than the pseudo-rhombohedral symmetry of quartz. If confirmed, the monoclinic symmetry class of quartz would be $C_2 = 2$, not $D_3 = 32$. F. A. B.

Atanasoff (John V.) & Kammer (Erwin). *A determination of the c_{44} elastic constant for beta-quartz.* Physical Rev. (Amer. Physical Soc.), 1941, vol. 59, pp. 97–99, 1 fig.

By modifying the mathematical equations utilized by Atanasoff and Hart (preceding abstract) and using their method, c_{44} for β-quartz is found to be $35{\cdot}75 \times 10^{10}$ dynes/cm.^{2} at 600° C. F. A. B.

Lawson (A. W.). *Comment on the elastic constants of alpha-quartz.* Physical Rev. (Amer. Phys. Soc.), 1941, vol. 59, pp. 838–839.

Mathematical theory on the relations between the elastic constants and the frequency of piezoelectric vibration. L. J. S.

Rosenholtz (Joseph L.) & Smith (Dudley T.). *Linear thermal expansion of adularia.* Amer. Min., 1941, vol. 26, pp. 391–394, 1 fig.

Adularia from Val Cristallina, Grisons, Switzerland, sp. gr. 2·559; α 1·519, β 1·523, γ 1·525, yields SiO_2 64·69, TiO_2 nil, Al_2O_3 18·69, Fe_2O_3+ FeO 0·04, MgO 0·07, CaO 0·03, Na_2O 0·74, K_2O 15·78, H_2O+ 0·07, H_2O- 0·03, total 100·14. The thermal expansion from 0° to 1000° C. of three sections cut from this material was studied by the method previously described for quartz [M.A. 8–69]. A large expansion was obtained parallel to *a*, a very small negative value for *b*, and a very small positive value for *c*. Abrupt changes in the rate of expansion or contraction occurred at twelve temperature regions between 120° and 950° C. F. A. B.

Kelley (K. K.). *The specific heats at low temperatures of ferrous silicate, manganous silicate and zirconium silicate.* Journ. Amer. Chem. Soc., 1941, vol. 63, pp. 2750–2752, 1 fig.

The specific heat C_p (calories per gram formula mass) has been determined at several temperatures; the extreme values are:

	C_p at 52° K.	C_p at 295° K.	Entropy at 298° K.
Fe_2SiO_4	8·63	31·57	35·4
$MnSiO_3$	3·59	20·52	21·3
$ZrSiO_4$	1·86	23·37	20·1

L. J. S.

Le Quéré (Henri). *Sur un appareil propre à déceler la pyroélectricité.* Bull. Soc. Franç. Min., 1936, vol. 59, pp. 137–142, 3 figs.

A method is described of measuring the pyroelectric charge of small crystals with a quadrant electrometer. Topaz, scolecite, natrolite, prehnite, and axinite, but not dioptase, are pyroelectric. The charges on a small crystal of tartaric acid are not neutralized by conduction for an hour and a half. F. A. B.

Mendelssohn (Th.) & Dember (H.). *Iyi mücerrit kristallerde fotokristal hadiseye ait malûmat. I. Çinkoblendi.—Zur Kenntnis des Kristallphotoeffektes in hochisolierenden Kristallen. I. Zinkblende.* Istanbul Üniversitesi Fen Fakültesi Mecmuasi (Rev. Fac. Sci. Univ. Istanbul), 1939, vol. 4, pp. 271–281, 6 figs. (German with Turkish summary.)

Crystals of zinc-blende from Santander (Spain), Saratoga (Mexico), Cumberland, and Balia (Turkey) between electrodes in an electric furnace were illuminated by a carbon-arc through a hole in one electrode. An electric current passes in the same direction as the light. Different crystals gave varying results; curves show maximum values at temperatures between 200° and 400° C. The highest values obtained are 2·45 volts at 314° C. (usual values 0·1–0·6 volt at 200–300° C.) and $3{\cdot}1 \times 10^{-10}$ ampère and 0·01 volt at 520° C. [M.A. **5**–212, **6**–494.] L. J. S.

Herman (Robert C.) & Hofstadter (Robert). *Photoconductivity of a natural willemite crystal.* Physical Rev. (Amer. Physical Soc.), 1941, vol. 59, pp. 79–84, 8 figs.

The photoconductivity of a crystal of willemite from Franklin Furnace, New Jersey, has been measured for wave-lengths between 2300 and 4400 Å. at 24°, 93°, −64°, and −155° C. The dependence of the crystal current upon time was also studied. [M.A. **8**–70.]

F. A. B.

Crystal-optics.

Haff (John C.). *Determination of extinction angles in augite and hornblende with the universal stage according to the method of Conrad Burri.* Amer. Journ. Sci., 1941, vol. 239, pp. 489–492, 1 fig.

An account of C. Burri's method [M.A. **5**–71] for English-speaking students. A stereographic plot of the cleavage direction and of α, β, and γ gives the angle $c:\gamma$. L. J. S.

Gaudefroy (C.). *Sur la méthode de mesure de la biréfringence par le spectre cannelé de Fizeau et Foucault.* Bull. Soc. Franç. Min., 1938, vol. 61, pp. 304–307.

White light passed through a birefringent plate of sufficient retardation placed between crossed polarizers and examined by a spectroscope yields a channelled spectrum. A measure of the birefringence can be calculated from the number of bands and the corresponding wave-lengths. Owing to their width the method is liable to substantial error.

F. A. B.

Capdecomme (L.). *Recherches sur les mesures de pouvoirs réflecteurs au moyen du microscope.* Bull. Soc. Franç. Min., 1938, vol. 61, pp. 5–118, 13 figs.

A detailed and critical account of the theory and experimental technique of the measurement of the reflecting power of polished ore surfaces in polarized light with the microscope. F. A. B.

Rudnick (Philip), Slack (F. G.), & O'Connor (John). *Rotatory power of nickel sulphate at low temperatures.* Physical Rev. (Amer. Phys. Soc.), 1940, vol. 58, p. 1003.

The natural rotation given by α-$NiSO_4.6H_2O$ is lower in liquid air than at room-temperature, while the magnetic rotation is increased. L. J. S.

Gaudefroy (C.). *Sur une frange remarquable observée en lumière convergente avec des lames cristallines.* Bull. Soc. Franç. Min., 1937, vol. 60, pp. 373–394, 10 figs.

When a cleavage plate of gypsum enclosed between two 45° glass prisms is viewed in a polarizer with sodium-light a series of hyperbolic fringes is seen, one of which is outstanding in width and intensity. The effect of varying the wave-length of the incident radiation is figured and described, and the phenomenon explained from a consideration of sections of the ellipsoid of refractive indices and the surface of relative birefringences. The singular fringe corresponds to minimum retardation and illustrates, like the phenomenon of internal conical refraction, the exactness of the Fresnel theory. F. A. B.

Ekstein (H.). *Sur l'ultramicroscopie dans les cristaux optiquement anisotropes.* Bull. Soc. Franç. Min., 1938, vol. 61, pp. 284–290, 3 figs.

An ultramicroscopic particle enclosed in an anisotropic medium behaves as a point source and diffuses incident light yielding two extraordinary images. The vertical distance between them is calculated for a uniaxial medium and checked experimentally for an inclusion in calcite. F. A. B.

Déribéré (Maurice). *Phénomène de thermoluminescence dans quelques marbres.* Bull. Soc. Franç. Min., 1938, vol. 61, pp. 295–296.

The orange thermoluminescence of several European marbles appears to be independent of the geological age of the rock. [M.A. 7–193.] F. A. B.

Inoue (Tomoji), Kunitomi (Minoru), & Shibata (Eiichi). *Über Triboluminescenz.* Journ. Sci. Hirosima Univ., Ser. A, 1939, vol. 9, pp. 129–136, 5 figs.

Various forms of apparatus for grinding materials in a partial vacuum and at different temperatures are described, and many inorganic substances were tested. NaCl crystallized from fusion shows a strong blue-white triboluminescence, while ordinary salt shows none. Quartz, both crystallized and fused, glows strongly. ZnS, ZnO, and BeO are active only when they contain impurities, especially MnS in ZnS. An explanation of the phenomenon in connexion with crystal-structure is suggested. [M.A. **4**–211, **7**–251.] L. J. S.

Tuda (Satoru), Taketa (Takeshi), & Shibata (Eiichi). *Über Kristallolumineszenz.* Journ. Sci. Hirosima Univ. Ser. A, 1939, vol. 9, pp. 137–144, 3 figs.

A crystallizing apparatus is described, and the intensity of the crystalloluminescence was measured photographically. As_2O_3 showed the maximum effect in a 4·2 N solution of HCl (at which concentration the solubility is greater). The cause of the luminescence is attributed to the formation of a 'block' structure in the crystals. [M.A. **4**–211.] L. J. S.

Chatelain (Pierre). *Propriétés optiques du para-azoxyphénétol et du para-azoxyanisol aux états: cristaux solides, cristaux liquides, liquides isotropes.* Bull. Soc. Franç. Min., 1937, vol. 60, pp. 280–370, 2 pls., 14 text-figs.

The preparation of larger crystals of the two substances investigated permitted more accurate X-ray and goniometric data of crystals in the solid state. The axial ratios of para-azoxyphenetole are $a:b:c = 2{\cdot}93:1:3{\cdot}23$, β 85° 40′, and unit-cell dimensions are a 15·8, b 5·43, c 17·6 Å. The axial ratios of para-azoxyanisole are $a:b:c = 1{\cdot}988:1:2{\cdot}590$, β 81° 40′. The dispersion, absorption, and dichroism of both substances in the solid state have also been measured. The two refractive indices of the nematic liquids have been measured with increasing temperature and change of wave-length by the Newton's rings method. The birefringence decreases when the temperature rises to the point of transformation to isotropy, ϵ diminishing rapidly whilst ω increases slowly. Other studies upon the liquid crystals include measurement of dispersion and absorption, the effect of a magnetic field, and the influence of the walls of the containing cell upon the molecular orientation. F. A. B.

Mathieu (Jean-Paul). *Examen de quelques propriétés optiques fondamentales des substances cholestériques.* Bull. Soc. Franç. Min., 1938, vol. 61, pp. 174–195, 11 figs.

A study of the rotatory dispersion of the esters of cholesterol particularly the propionate. Light transmitted through thin layers of the liquid crystals is elliptically polarized and becomes circularly polarized when the thickness exceeds 20 μ for the propionate. It is proved that the rotatory power becomes zero for the inversion wave-length when the ellipticity is a maximum. F. A. B.

X-rays and Crystal-structure.[1]

Preston (G. D.). *Anomalous reflexions in X-ray patterns.* Proc. Roy. Soc. London, Ser. A, 1941, vol. 179, pp. 1–7, 4 figs.

Diffuse reflections on Laue photographs of a copper-aluminium alloy and of sodium chloride can be accounted for by an approximation to Faxén's theory [M.A. 8–128]. The diffuse spots due to a wave-like thermal disturbance of the lattice can be regarded as normal Bragg reflections from fictitious planes with, if necessary, fractional values of h, k, and l. [M.A. 8–129.] F. A. B.

Lonsdale (K.) & Smith (H.). *An experimental study of diffuse X-ray reflexion by single crystals.* Proc. Roy. Soc. London, Ser. A, 1941, vol. 179, pp. 8–50, 28 pls., 11 text-figs.

A detailed study, illustrated by numerous beautiful photographs, of the conditions under which diffuse spots are produced on Laue, oscillation, and rotation photographs (taken with unfiltered, filtered, or monochromatized Cu, Mo, and Ag X-rays) of sylvine, diamond, sodium nitrate, and various organic substances. The relation of the diffuse to the ordinary Bragg reflections is best described in terms of the reciprocal lattice. Each point of this lattice (corresponding to a reflecting plane of the crystal) 'is surrounded by a region of diffuse scattering, whose physical significance is open to various theoretical interpretations. These diffusely reflecting regions are not, in general, spherical, but are extended along reciprocal lattice planes and axes'. [M.A. 8–129, 130.] F. A. B.

[1] The first seven of these abstracts are of papers based on a discussion on the diffuse reflections of X-rays by crystals and published in Proc. Roy. Soc. London, Ser. A, 1941, no. 976 (price 9*s*.). [M.A. 8–127.]

Bragg (*Sir* William H.). *The diffuse spots in X-ray photographs.* Proc. Roy. Soc. London, Ser. A, 1941, vol. 179, pp. 51–60, 8 figs.

—— *The diffuse spots in X-ray crystal photographs.* Ibid., pp. 94–101, 1 pl., 10 text-figs.

—— *Diffuse spots in X-ray crystal photographs.* Nature, London, 1941, vol. 148, pp. 112, 780, 2 figs.

Diffraction patterns calculated from first principles for diamond, calcite, and sylvine are in agreement with observations. The horn-like attachments to certain diffuse spots on diamond photographs as well as the triangular spots observed by K. Lonsdale are details which can also be explained. Not all positions theoretically possible for diffuse spots are occupied, however. The diffraction formula can only be applicable if there is 'a sufficient number of small crystalline groups acting with some independence of each other'. [M.A. 8–130.] F. A. B.

Bragg (*Sir* W. Lawrence). *Diffraction of monochromatic X-rays by crystals at high temperatures.* Proc. Roy. Soc. London, Ser. A, 1941, vol. 179, pp. 61–64, 1 fig.

A qualitative version of Debye and Waller's theory of heat vibrations views the diffuse reflections as due to modulations of the crystal lattice by heat waves, rather than a breaking down of the lattice into small independently scattering elements. The former treatment accounts for both sharp spots and the diffuse spots, whereas the latter cannot account for the sharp spots which appear at all temperatures. F. A. B.

Darwin (C. G.). *Diffuse reflexions of X-rays by crystals.* Proc. Roy. Soc. London, Ser. A, 1941, vol. 179, pp. 65–66.

If the relative intensities of the ordinary Laue spots and the diffuse reflections were measured, data would be available for testing the adequacy of the Preston-Bragg theory of diffuse spots as due to small groups of atoms. F. A. B.

Finch (G. I.). *Diffuse reflexions of X-rays by crystals.* Proc. Roy. Soc. London, Ser. A, 1941, vol. 179, pp. 67–68.

Diffuse-area patterns are obtained in electron diffraction photographs of crystals of some organic compounds which are directly associated with the orientation of the individual molecules. This effect is also dependent upon imperfections produced in the crystal lattice by thermal agitation. F. A. B.

Born (Max). *Diffuse reflexion of X-rays.* Nature, London, 1941, vol. 147, p. 674.

Born (M.) & Sarginson (Kathleen). *The effect of thermal vibrations on the scattering of X-rays.* Proc. Roy. Soc. London, Ser. A, 1941, vol. 179, pp. 69–93.

'Formulae are derived representing the Laue spots and the background for any crystal as function of its structure and of temperature. These formulae are simplified by applying them to the case of the three cubic Bravais lattices; for the body centred lattices one obtains an expression for the position of the spots which is identical with that given by Bragg, but with an additional law expressing the dependence of intensity on temperature. Approximate formulae are developed for all three cubic Bravais lattices which describe the position, shape, and intensity of the "extra spots" in the vicinity of Laue spots.' F. A. B.

Lonsdale (K.) & Smith (H.). *A secondary diffraction effect on Laue photographs of diamond.* Proc. Physical Soc. London, 1941, vol. 53, pp. 529–531, 1 pl.

Well-exposed photographs of a crystal of diamond correctly set to reflect copper or iron Kα or β X-rays from (111), (220), or (113) show sharp diffraction curves around Laue spots for these planes. These are due to secondary diffraction by the black paper used to protect the X-ray film from ordinary light. F. A. B.

Lonsdale (K.) & Smith (H.). *Diffuse X-ray diffraction from the two types of diamond.* Nature, London, 1941, vol. 148, pp. 112–113, 8 figs.

—— —— *Temperature study of the diffuse X-ray diffraction by diamonds.* Ibid., 1941, vol. 148, pp. 257–258, 4 figs.

Different diffuse reflection effects have been observed for the two types of diamond distinguished by Robertson, Fox, and Martin [M.A. **5**–209, 213; **6**–6, 494]. Ordinary anisotropic diamond of type I shows both primary diffuse scattering and also a secondary diffuse scattering consisting of sharp intense streaks or triangles of sharp spots. The comparatively rare diamond of type II, which is more transparent to infra-red and ultra-violet radiations, shows only primary diffuse scattering. The latter effect observed for both types of diamond is very sensitive to change of temperature, whereas the more striking secondary diffuse scattering, which varies considerably from one crystal of diamond to another, is little affected by temperature change. The primary

scattering corresponds closely to the diffuse spots observed for all other substances under suitable conditions, whereas the secondary effects only observed for diamond of type I are not typical of diffuse diffraction and perhaps have a different origin. F. A. B.

Lonsdale (K.) & Smith (H.). *X-ray diffuse reflexions from sodium and lithium in relation to elastic anisotropy.* Nature, London, 1941, vol. 148, pp. 628–629, 9 figs.

The Faxén-Waller theory predicts that the distribution of reflecting power is different for different reciprocal lattice points of an elastically anisotropic cubic crystal. The diffuse-spot detail observed for various planes of sodium and lithium is in agreement with this theory. [M.A. 8–134.] F. A. B.

Lu (S. S.) & Chang (Y. L.). *The accurate evaluation of lattice spacings from back-reflection powder photographs.* Proc. Physical Soc., London, 1941, vol. 53, pp. 517–528, 1 pl., 7 text-figs.

A study of the errors inherent in the method of measuring lattice spacings with high angle or back-reflections; and how to correct them. Extrapolation to $\cos\theta = 1$ gives the correct lattice constant for cubic substances. Values correct to 1×10^{-4} Å. are given for artificial preparations of Al, α-Fe, Ni, Cu, Mo, W, Pb, Cd, and Sb. F. A. B.

Wolfe (C. W.). *A check on unit cell constants derived from 1-layer-line Weissenberg pictures.* Amer. Min., 1941, vol. 26, pp. 134.

Rotation and 0-layer-line Weissenberg pictures about [001] afford a useful check for triclinic lattice constants. F. A. B.

Lukesh (Joseph S.) & Chesley (Frank G.). *Graphical interpretation of cubic powder patterns.* Amer. Min., 1941, vol. 26, p. 395, 1 pl.

A chart of curves on transparent paper has been reproduced, each curve showing the variation of position of a powder line from a given cubic plane with cell edge (camera diameter 57·26 mm., copper Kα radiation). A powder photographic film is superposed on the chart and moved up and down until coincidence of all observed lines with all or some of the abscissae marked by the curves is obtained. The cell edge can then be read off directly. F. A. B.

Lipson (H.) & Stokes (A. R.). *Structures of thallium.* Nature, London, 1941, vol. 148, p. 437.

At room-temperature the structure is hexagonal, and at 262° C. it is body-centred cubic with a 3·874 Å. L. J. S.

Brager (A.). *An X-ray examination of titanium nitride. I. Single crystal investigation.* Acta Physicochimica U.R.S.S., 1939, vol. 10, pp. 593–600, 3 figs. *II. The structure of some intermediate products formed when obtaining titanium nitride.* Ibid., 1939, vol. 10, pp. 887–902, 3 figs. *III. Investigation by the powder method.* Ibid., 1939, vol. 11, pp. 617–632, 4 figs.

TiN prepared at about 1400° C. is blue-black with a 4·22 Å. and sp. gr. 4·73 (calc. d 5·43), while when prepared at about 1600° it is brown or yellow with a 4·235 Å. and sp. gr. 5·1. Both have the rock-salt structure, but the low-temperature preparation has vacant spaces in the Ti lattice. [Min. Mag. **26**–36.] L. J. S.

Brager (A.). *On the dependence of the unit cube edge of the compounds TiC, TiN, TiO on the radius of the metalloid atom.* Acta Physicochimica U.R.S.S., 1940, vol. 13, pp. 723–724, 1 fig.

The edge of the unit cube in this series decreases with increasing atomic weight of C, N, O. L. J. S.

Epelbaum (V.) & Brager (A.). *An X-ray examination of vanadium nitride. I. The process of thermal decomposition of ammonium vanadate and the formation of vanadium nitride.* Acta Physicochimica U.R.S.S., 1940, vol. 13, pp. 595–599, 1 fig.

Brager (A.) & Epelbaum (V.). *An X-ray examination of vanadium nitride. II. A precision determination of the unit cube edge of vanadium nitride.* Ibid., 1940, vol. 13, pp. 600–603, 1 fig.

VN, prepared by passing a current of NH_3 over ammonium vanadate at 1000–1100° C., has a 4·129 Å. (not 4·28). In the series VC, VN, VO the cube edge decreases with increasing atomic weight of C, N, O. L. J. S.

Brasseur (H.) & Rassenfosse (A. de). *Structure cristalline des cyanures doubles de baryum à base de platine, de palladium et de nickel.* Bull. Soc. Franç. Min., 1938, vol. 61, pp. 129–136, 3 figs.

The barium and nickel atoms have been more accurately located in the crystal-structure of $BaNi(CN)_4.4H_2O$ and a Fourier projection on the c plane has led to the determination of the parameters of the CN groups and the water molecules. Each nickel atom is surrounded by four coplanar CN groups. The palladium and platinum salts yield atomic parameters close to those for the nickel compound. [M.A. **6**–42, **7**–279.] F. A. B.

Lewis (Burton) & Elliott (Norman). *Interatomic distances in cobalt diselenide.* Journ. Amer. Chem. Soc., 1940, vol. 62, pp. 3180–3181, 2 figs.

$CoSe_2$ has the pyrite structure with a 5·845 Å. The parameter is now fixed as u 0·377 Å., and the atomic distances Co–Se 2·43, Se–Se 2·49 Å. L. J. S.

Tunell (George). *The atomic arrangement of sylvanite.* Amer. Min., 1941, vol. 26, pp. 457–477, 3 figs.

Weissenberg photographs of sylvanite crystals from three localities yield a 8·94, b 4·48, c 14·59 Å., β 34° 34′$\pm$20′. The unit cell containing $2AuAgTe_4$ has the space-group $C_{2h}^4 = P2/c$. The transformation from Schrauf's setting is $\bar{\frac{1}{2}}0\frac{1}{2}/0\bar{\frac{1}{2}}0/100$. The crystal-structure has been derived from intensities of indexed lines on a powder photograph and a Fourier projection on (010). Each gold atom and each silver atom is surrounded octahedrally by six tellurium atoms, and each tellurium atom is surrounded octahedrally by three tellurium atoms, two gold atoms, and one silver atom, or by three tellurium atoms, two silver atoms, and one gold atom. Lines of atoms parallel to the a-axis consist of metal atoms separated by pairs of tellurium atoms. F. A. B.

Berry (L. G.). *Studies of mineral sulpho-salts: IV—Galenobismutite and "lillianite".* Amer. Min., 1940, vol. 25, pp. 726–734, 10 figs.

X-ray data on galenobismutite, sp. gr. 7·04, Kogrufvan, Nordmark, Sweden, from part of a specimen first named and analysed by Sjögren (1878) are a 11·72, b 14·52, c 4·07 Å., space-group $D_{2h}^{16} = Pnam$ or $C_{2v}^9 = Pna2$. The unit-cell contents are $4[PbS.Bi_2S_3]$. Polished sections are white and strongly anisotropic; etch reactions are described. Polished sections and X-ray photographs of 'lillianite' from Gladhammar, Sweden, reveal a fine-grained intergrowth of galena and galenobismutite. Flink's crystal measurements (1910) agree well with the X-ray data if Flink's c-axis be halved. X-ray powder photographs of so-called 'lillianite' from Mt. Farrell, Tasmania, and galenobismutite from Cariboo mine, Barkerville, British Columbia, confirm that both are identical with the type material from Nordmark. F. A. B.

Usmani (I. H.). *A study of the growth of chemical compounds on a copper single crystal by the method of electron diffraction.* Phil. Mag., 1941, ser. 7, vol. 32, pp. 89–105, 3 pls., 18 figs.

Thin films of cuprous iodide, bromide, sulphide, and oxide, formed

electrolytically on an etched surface of a copper crystal, were examined by the reflection or transmission methods of electron diffraction. At small current densities the films are single crystals oriented so that the most densely packed (111) planes are parallel to the (111) plane of the copper crystal. The copper sulphide film has cubic symmetry with unit-cell edge 4·058 Å. Copper sulphide films formed by hydrogen sulphide upon copper yield spot patterns with hexagonal symmetry and have a crystal-structure different from that of Cu_2S and CuS. F. A. B.

Hutchison (Clyde A.) & Johnston (Herrick L.). *Determination of crystal densities by the temperature of flotation method. Density and lattice constant of lithium fluoride.* Journ. Amer. Chem. Soc., 1940, vol. 62, pp. 3165–3168.

By the method of 'temperature-flotation' the density of LiF was determined as $2{\cdot}63905 \pm 0{\cdot}00001$ at 25° C. This gives the lattice constant as a 4·01736 Å. [M.A. **3**–179, 246.] L. J. S.

Sillén (Lars Gunnar). *X-ray studies on BiOCl, BiOBr and BiOI.* Svensk Kemisk Tidskrift, 1941, vol. 53, pp. 39–43.

BiOCl was prepared by heating CdO and $BiCl_3$ in an open crucible at 400° C.; BiOBr and BiOI from Bi_2O_3 and HBr or HI. Single crystals were obtained by slowly cooling solutions of the oxyhalides in fused $CdCl_2$, $CdBr_2$, or CdI_2. The unit-cell dimensions, BiOCl (a 3·883, c 7·347 Å.), BiOBr (a 3·915, c 8·076 Å.), BiOI (a 3·984, c 9·124 Å.), agree closely with those previously determined [Min. Mag. **24**–51]. Interatomic distances are also given. At 600° C. new compounds are formed which give X-ray powder photographs richer in lines than those of BiOX. L. J. S.

Hoard (J. L.) & Vincent (W. B.). *Structures of complex fluorides. Barium fluosilicate and barium fluogermanate.* Journ. Amer. Chem. Soc., 1940, vol. 62, pp. 3126–3129, 1 fig.

$BaSiF_6$ forms acicular hexagonal prisms terminated by rhombohedral faces; sp. gr. 4·29 (calc. d 4·41). The unit cell, a 4·75 Å., α 97° 58′ (a 7·17, c 6·99 Å.), contains one molecule. $BaGeF_6$ has a 4·83 Å., α 98° 1′ (a 7·29, c 7·10 Å.). Both have the space-group $D^5_{3d} = R\bar{3}m$. The Ba atoms have a CsCl-like arrangement and SiF_6 (or GeF_6) are in nearly regular octahedral grouping. L. J. S.

Palache (Charles). *Diaboleite from Mammoth mine, Tiger, Arizona.* Amer. Min., 1941, vol. 26, pp. 605–612, 4 figs.

Diaboleite [Min. Mag. **20**–78] from this locality occurs as brilliant

thin plates 1 mm. across up to stubby crystals $1\frac{1}{2}$ cm. across associated with quartz, hemimorphite, linarite, boleite, &c. Forms developed are c(001) perfect cleavage, a(010), m(110), r(012), e(011), s(021), n(112), p(111), (203), (302), (401), and probably (1.0.10), (209), and (104), axial ratio $a:c = 1:0{\cdot}9361$. Crystals, sp. gr. 5·42 (not 6·412), with ω 1·98, ϵ 1·85, yield unit-cell dimensions a 5·83, c 5·46 Å. with space-group $C_{4v}^1 = P4mm$. This is the first example amongst minerals of the hemimorphic ditetragonal class of symmetry. Chemical analysis by F. A. Gonyer gives PbO 72·01, CuO 12·68, Cl_2 11·42, H_2O 6·03, insol. 0·19, total 102·33, less O for Cl_2 2·57, 99·76. The unit-cell contents are $Pb_2CuCl_2(OH)_4$. F. A. B.

Moore (Walter J. *Jr.*) & Pauling (Linus). *The crystal structures of tetragonal monoxides of lead, tin, palladium, and platinum.* Journ. Amer. Chem. Soc., 1941, vol. 63, pp. 1392–1394.

PbO has a 3·947, c 4·988 Å., space-group $D_{4h}^7 = P4/nmm$; and SnO has a 3·796, c 4·816 Å.; PbO has the structure given by Dickinson and Friauf [M.A. **2**–514] and not that suggested by Levi and Natta [M.A. **3**–249]; SnO has a similar structure. PdO has a 3·02, c 5·31 Å., space-group $D_{4h}^9 = P4/mmc$; and PtO has a 3·04, c 5·34 Å.; these have the structure suggested by Huggins (1932), in which the metal atom forms a coplanar rectangular co-ordination group. L. J. S.

Gross (S. T.). *Unit cell measurements of Pb_3O_4, Pb_2O_3 and Tl_2SO_4.* Journ. Amer. Chem. Soc., 1941, vol. 63, p. 1168, 1 fig.

Pb_3O_4 is tetragonal (not monoclinic) with a 8·86, c 6·66 Å., d 9·1, and four molecules in the unit cell; probable space-group $D_{2d}^7 = P\bar{4}b2$. Pb_2O_3 is monoclinic with a 7·03, b 5·62, c 3·93 Å., β 82°, d 9·925, and two molecules in the unit cell; probable space-group $C_{2h}^2 = P2_1/m$ or $C_2^2 = P2_1$. Thallous sulphate is orthorhombic with a 10·68, b 6·02, c 7·81 Å., d 6·77, and $4Tl_2SO_4$ in the unit cell; space-group $V_h^{16} = Pnma$. L. J. S.

Sillén (Lars Gunnar). *On the crystal structure of monoclinic α-Bi_2O_3.* Zeits. Krist., 1941, vol. 103, pp. 274–290, 15 figs.

By the preparation of larger needles of monoclinic α-Bi_2O_3 and the Patterson-Harker analysis of Weissenberg photographs the exact positions of the bismuth atoms in the crystal-structure have been derived and probable ones for the oxygen atoms. The unit cell containing $4Bi_2O_3$ has a 5·83, b 8·14, c 7·48 Å., β 67° 7′; space-group $C_{2h}^5 = P2_1/c$. [M.A. **7**–234.] F. A. B.

Richmond (W. E.). *Shortite: correction of space group.* Amer. Min., 1941, vol. 26, pp. 629–630.

Crystals of shortite ($Na_2CO_3.2CaCO_3$) are found to possess a vertical diad axis and the space-group should be $C_{2v}^{14} = Amm2$, not $D_2^6 = A222$. [M.A. **8**–139.] F. A. B.

Murdoch (Joseph). *Crystallography of ulexite.* Amer. Min., 1940, vol. 25, pp. 754–762, 5 figs.

Massive aggregates of ulexite from Suckow mine, Kramer district, San Bernardino Co., California, sp. gr. 1·955, hardness $2\frac{1}{2}$, yield small crystals which show forms $c(001)$, $b(010)$, $a(100)$, $m(110)$, $M(\bar{1}10)$, $s(0\bar{1}1)$, $o(\bar{1}01)$, $t(\bar{1}11)$, $p(1\bar{1}1)$, $d(\bar{1}21)$, and more rarely $z(2\bar{3}2)$, $x(\bar{5}32)$, $g(\bar{2}51)$, $l(270)$, $h(350)$, and $k(230)$; axial ratios $a:b:c = 0{\cdot}6855:1:0{\cdot}5191$, α 90° 16′, β 109° 8′, γ 105° 7′. Most of the crystals are flattened on (100) and have cleavages (010) perfect, $(1\bar{1}0)$ good, and (110) poor. A stereogram of the optical orientation is given and Larsen and Berman's refractive index data are confirmed; 2V 73°±1°, positive, $\beta:c = 21\frac{1}{2}°$. Chemical analysis by F. A. Gonyer yields CaO 13·92, Na_2O 7·78, B_2O_3 43·07, H_2O 35·34, total 100·11. Using X-ray oscillation photographs about the axis of elongation c and the goniometric data, the unit-cell dimensions are a 8·71, b 12·72, c 6·69 Å., with contents $2[NaCaB_5O_9.8H_2O]$. F. A. B.

McMurdie (Howard F.). *X-ray studies of compounds in the systems PbO–B_2O_3 and K_2O–PbO–SiO_2.* Journ. Research National Bureau Standards, U.S.A., 1941, vol. 26, pp. 489–494.

X-ray powder data are given for α-$4PbO.B_2O_3$, β-$4PbO.B_2O_3$, α-$2PbO.B_2O_3$, $5PbO.4B_2O_3$, $PbO.2B_2O_3$, $K_2O.4PbO.8SiO_2$, $K_2O.PbO.SiO_2$, and $K_2O.2PbO.2SiO_2$. The last compound with sp. gr. 5·15 is optically uniaxial with hexagonal symmetry and unit-cell edges a 5·62, c 7·57 Å., space-group $C_{3i}^1 = C\bar{3}$, and contents $K_2Pb_2Si_2O_7$. A probable crystal-structure containing Si_2O_7 groups is outlined. F. A. B.

Klug (Harold P.) & Alexander (Leroy). *Crystal-chemical studies of the alums. I. Solid solutions of potassium aluminum alum and ammonium aluminum alum.* Journ. Amer. Chem. Soc., 1940, vol. 62, pp. 1492–1493, 1 fig. [M.A. **8**–10.]

Klug (Harold P.).—*II. The purple chrome alums.* Ibid., pp. 2992–2993.

Klug (Harold P.) & Alexander (Leroy).—*III. Further solid solution studies.* Ibid., pp. 2993–2995, 1 fig.

K-Al-alum has a 12·133 Å., and NH_4-Al-alum 12·214 Å.; the plot of

the lattice constants of mixed crystals shows only a slight deviation from Vegard's law of additivity. K-Cr-alum has a 12·175 Å., and NH_4-Cr-alum 12·251 Å.; data for other chrome-alums with Rb, Cs, Tl, and NH_3CH_3 show an average difference of 0·038 Å. from the corresponding Al-alums; K-Cr- and NH_4-Cr-alums are of the α type of structure and the others of the β type [M.A. **6**–182, 334]. III gives data for mixed crystals Tl-Al–NH_4-Al, Tl-Al–K-Al, and NH_4-Cr–K-Cr alums; Tl-Al-alum has a 12·206 Å. L. J. S.

Wolfe (C. W.). *Classification of minerals of the type* $A_3(XO_4)_2.nH_2O$. Amer. Min., 1940, vol. 25, pp. 738–753, 787–809, 6 figs.

A classification is proposed based on water content and then subdivided according to symmetry. An analysis of collinsite [M.A. **3**–470], sp. gr. 2·992, by F. A. Gonyer gives P_2O_5 41·13, CaO 32·03, MgO 9·31, FeO 7·31, H_2O 9·69, impurities 0·37, total 99·84. The unit cell containing $Ca_2(Mg,Fe)(PO_4)_2.2H_2O$ measures a 5·70, b 6·72, c 5·38 Å., α 96° 48½′, β 107° 16½′, γ 104° 32′. Only two cleavages are found, (001) and (010); the space-group is $C_i^1 = P\bar{1}$. Fairfieldite crystals, sp. gr. 3·082, from Buckfield, Maine, exhibit four forms, c(001) cleavage perfect, b(010) cleavage good, $M(1\bar{1}0)$ cleavage distinct, and $P(\bar{1}\bar{1}1)$ highly etched; goniometric measurements yield $a:b:c = 0{\cdot}8791:1:0{\cdot}8331$, α 102° 5′, β 108° 42½′, γ 90° 5′. The unit cell containing $Ca_2(Mn,Fe)(PO_4)_2.2H_2O$ measures a 5·77, b 6·56, c 5·47 Å., space-group $C_i^1 = P\bar{1}$. Roselite and brandtite are found to be isostructural. The unit cell of roselite, sp. gr. 3·695, measures a 5·60, b 12·80, c 5·60 Å., β 79° 15′, space-group $C_{2h}^5 = P2_1/c$, and contains $2[Ca_2(Co,Mg)(AsO_4)_2.2H_2O]$. Brandtite, sp. gr. 3·671, with the same space-group has unit cell a 5·65, b 12·80, c 5·65 Å., β 80° 30′, and contains $2[Ca_2Mn(AsO_4)_2.2H_2O]$. Roselite twins on (100) simulate orthorhombic symmetry. The hardness of brandtite is found to be 3½, not 5–5½ (Dana). Reddingite, sp. gr. 3·22, has unit-cell dimensions a 9·52, b 10·06, c 8·70 Å., space-group $D_{2h}^7 = Pmna$ and cell contents $4[(Mn,Fe)_3(PO_4)_2.3H_2O]$. The material used was that analysed by F. A. Gonyer [M.A. **4**–344]. Parahopeite, sp. gr. 3·307, has a 5·755, b 7·535, c 5·292, α 93° 17½′, β 91° 55′, γ 91° 19′, space-group $C_i^1 = P\bar{1}$, and unit-cell contents $Zn_3(PO_4)_2.4H_2O$. The unit cell of anapaite, sp. gr. 2·812, measures a 6·41, b 6·88, c 5·86, α 101° 34½′, β 104° 5½′, γ 71° 3½′, with space-group $C_i^1 = P\bar{1}$ and contents $Ca_2Fe(PO_4)_2.4H_2O$. The transformation from Palache's setting of anapaite [M.A. **5**–478] is $00\bar{1}/010/\bar{1}00$. Analysis by F. A. Gonyer and X-ray work on messelite show that it is a mixture of collinsite with a little unaltered anapaite.

The unit cell of phosphophyllite, sp. gr. 3·130, measures a 10·23, b 5·08, c 10·49 Å., β 59° 45′, space-group $C_{2h}^5 = P2_1/c$, and contains $2[Zn_2(Fe,Mn)(PO_4)_2.4H_2O]$; (100) and ($\bar{1}02$) are twin-planes. Crystals of hopeite from Broken Hill, Northern Rhodesia, are not piezoelectric and the holohedral symmetry of the mineral is confirmed. The unit cell containing $4[Zn_3(PO_4)_2.4H_2O]$ has a 10·64, b 18·32, c 5·03 Å., sp. gr. 3·04, space-group $D_{2h}^{16} = Pnma$. The transformation from Spencer's [Min. Mag. **15**–1] to the X-ray setting is 010/300/001. Optical measurements on a single crystal containing both α- and β-hopeite give α 1·589, β 1·598, γ 1·599; $\alpha = a$, $\beta = c$, $\gamma = b$; 2V 37°, negative. The X-ray single-crystal photographs of this crystal do not reveal the presence of two modifications. The physical properties are correlated with the symmetry of phosphophyllite, hopeite, and parahopeite; the relation between the unit cells of the first two minerals is given by the transformation 001/201/010 from phosphophyllite to hopeite. The unit cell of trichalcite from Turginsk, Urals, has a 10·34, b 26·9, c 5·57 Å., and doubt is thrown upon Hermann's original analysis. X-ray data show that symplesite is triclinic, not monoclinic as Krenner decided (1886). The unit cell containing $Fe_3(AsO_4)_2.8H_2O$, sp. gr. 3·012, has a 7·85, b 9·39, c 4·71 Å., α 99° 55′, β 97° 22½′, γ 105° 57½′; space-group $C_i^1 = P\bar{1}$. The transformation from Krenner's setting to the X-ray setting is $\frac{2}{5}\bar{1}0/\frac{2}{5}\bar{2}0/00\frac{1}{2}$. Crystals of vivianite from three different localities have specific gravities 2·687, 2·668, and 2·674, whilst annabergite from Laurion, Greece, yields the value 3·07, and erythrite from Schneeberg, Saxony, 3·09. Barth's X-ray data [M.A. **7**–259] on these three minerals are accepted. Köttigite crystals, sp. gr. 3·33, bearing the forms b(010), a(100), m(110), n(201), and v(221), yield axial ratios $a:b:c = 0·7593:1:0·3531$, β 75° 30′. Unit-cell dimensions are a 10·11, b 13·31, c 4·70 Å., β 76° 10′, with contents $2[Zn_3(AsO_4)_2.8H_2O]$; the space-group is $C_{2h}^3 = C2/m$. New optical data for sodium-light are α 1·622, β 1·638, γ 1·671; $\alpha = b$; $\gamma:c = 37°$; 2V 74°, positive. Incomplete X-ray data are given for hoernesite $Mg_3(AsO_4)_2.8H_2O$, sp. gr. 2·73, the fibre axis yielding a translation of 6·61 Å. F. A. B.

Machatschki (F.). *Synthese des Durangites, $NaAlF[AsO_4]$*. Zeits. Krist., 1941, vol. 103, pp. 221–227, 3 figs.

Small ($\frac{1}{3}$ mm.) crystals of durangite were prepared from As_2O_3 and cryolite in a bomb at 200° C. They are monoclinic, of prismatic or tabular habit, and show crossed twins on ($10\bar{1}$). Goniometric measurements gave $a:b:c = 0·787:1:0·875$, β 61° 42′, and X-rays a 6·69, b 8·68,

c' 7·42 (c 7·26) Å. Optic axial plane $\perp$(010), Bx_a nearly $\perp$(101), 2V 50°, negative. Revised data for natural durangite [M.A. **7**–89, 237] are a 6·63, b 8·57, c' 7·30 Å., β 60° 38′. The mineral is isotypic with sphene ($CaTiO(SiO_4)$). In this orientation of durangite [$10\bar{1}$] is [001] in Des Cloizeaux's position. L. J. S.

McConnell (Duncan). *X-ray crystallography of seamanite.* Amer. Min., 1941, vol. 26, pp. 446–447, 1 fig.

Seamanite from Chicagon mine, Michigan, has a 7·83, b 15·14, c 6·71 Å. with space-group $V_h^{16} = Pbnm$ and unit-cell contents $4[Mn_3(PO_4)(BO_3).3H_2O]$. The determined specific gravity is 3·08. Powder photographs of seamanite and reddingite are quite different and do not suggest isomorphism between the two minerals. F. A. B.

Strunz (H.). *Isotypie von Berlinit mit Quarz.* Zeits. Krist., 1941, vol. 103, pp. 228–229, 1 fig.

Berlinite from Westanå, Sweden, was described by C. W. Blomstrand in 1868 as $AlPO_4.\frac{1}{4}H_2O$ with H. 6–7. X-ray examination of the original material shows it to be hexagonal with a 4·92, c 10·91 Å., with three molecules in the unit cell and space-group D_3^4 or D_3^6; α 1·5235, γ 1·529. It is therefore identical with artificial $AlPO_4$ [M.A. **6**–183] and isomorphous with $AlAsO_4$ [M.A. **6**–183, 414], which are isotypic with quartz. L. J. S.

Thilo (Erich). *Über die Isotypie zwischen Phosphaten der allgemeinen Zusammensetzung $MeLi[PO_4]$ und den Silikaten der Olivin-Monticellit-Reihe.* Naturwiss., 1941, vol. 29, p. 329.

—— *Über die Isotypie zwischen Phosphaten der allgemeinen Zusammensetzung $(Me_1)_3(Me_2)_2[PO_4]_3$ und den Silikaten der Granatgruppe.* Ibid., p. 329.

B. Gossner and H. Strunz have already noted a similarity in the structures of triphylite and olivine [M.A. **5**–322]. By heating at 800° $MeNH_4PO_4.H_2O$ with Li_2CO_3 compounds in which Me is Ni, Co, Zn, Cu, Cd, Mn, Ca, or Mg were obtained. These give X-ray powder patterns similar to that of olivine. $LiMnPO_4$ is identical with lithiophilite.

The similarity in structure of berzeliite and garnet was noted by W. Bubeck and F. Machatschki [M.A. **6**–183]. $Na_3Al_2(PO_4)_3$ was prepared from $Na_3PO_4 + 2AlPO_4$, and $Ca_2Na.Mg_2(PO_4)_3$ from $Mg_2P_2O_7 + CaNaPO_4 + CaCO_3$. These compounds gave X-ray powder patterns similar to that of Ca-Fe-garnet. L. J. S.

Nagelschmidt (G.) & King (E. J.). *The biochemistry of silicic acid. 9. Isolation and identification of minerals in lung residues and air-borne dusts from coal mines.* Biochem. Journ., 1941, vol. 35, pp. 152–158, 1 pl.

The isolation of mineral residues from lungs by treatment with acetone, hydrogen peroxide, and dilute acid in turn and the removal of coal from such residues and from air-borne dusts from coal mines by heating to 380° C. are described. Both X-ray powder and aggregate photographs show that quartz, a mica (probably illite), and a member of the kaolinite family are present in both lung tissues and mine dusts. Chemical analyses of lung residues and mine dusts are given which, assuming the mineralogical composition found by X-ray work, yield 62 and 32 % mica (illite), 21 and 54 % kaolinite, 17 and 8 % quartz respectively. An independent determination of free quartz in mine dust ash yielded 12 %. F. A. B.

Kraus (O.) & Mussgnug (F.). *Identität von Lorenzenit und Ramsayit.* Naturwiss., 1941, vol. 29, p. 182.

Rotating-crystal X-ray photographs of ramsayite from Kola [M.A. **2**–250, **3**–111] gave a unit cell a 14·51, b 8·73, c 5·22 Å., containing 4 molecules $Na_2Ti_2Si_2O_8$, space-group probably $D_{2h}^4 = Pbcn$. Lorenzenite from Greenland gave a 14·51, b 8·76, c 5·23 Å. L. J. S.

Longchambon (Henri). *Sur certaines caractéristiques de la sépiolite d'Ampandandrava. Discussion sur la formule des sépiolites.* Bull. Soc. Franç. Min., 1937, vol. 60, pp. 232–276, 4 pls., 4 text-figs.

Previously published X-ray, chemical, dehydration, and dilatometric data on fibrous sepiolite from Ampandandrava, Madagascar, are presented as a connected account [M.A. **5**–334; **6**–63, 64, 142, 476, 477]. Cell dimensions are now given as a 20·2, b 14·9, c 5·30 Å. for the natural fibres, and a 19·1, b 15·8, c 5·30 Å. for the mineral after heating to 400–500° C., the a and b values being deduced as probable values for equatorial diffractions of fibre photographs. A detailed discussion is given of the various formulae that have been proposed for the sepiolites. F. A. B.

Schaacke (Ingeburg). *Ein neuer Zwilling beim Oxalsäuredihydrat $H_2C_2O_4.2H_2O$ mit Bemerkungen zur Struktur dieser Substanz.* Zeits. Krist., 1941, vol. 103, pp. 291–296, 3 figs.

Crystals of oxalic acid dihydrate prepared from concentrated HNO_3

solution show numerous contact twins on (11$\bar{1}$), X-ray setting [M.A. **6**–46], or (110) Groth's setting. The relation of the twin-plane to the crystal-structure is worked out. F. A. B.

Miscellaneous.

[Gerasimovsky (V. I.)] Герасимовский (В. И.). Уссингит Ловозерских тундр.—Gerassimovsky (V. I.). *Ussingite of Lovozersky tundras.* Труды Ломоносов. Инст. Акад. Наук СССР, Мин. Сер. (Trans. Lomonossov Inst. Acad. Sci. U.S.S.R., Ser. Min.), 1937, no. 10, pp. 5–28, 12 figs. (Russian with English summary.)

Ussingite, probably a secondary mineral after hackmanite, is found in pegmatites associated with sodalite-syenite in the Lovozero tundra of Kola peninsula. It is a compact fine-grained mineral of a light violet colour with a greasy or vitreous lustre. Sp. gr. 2·460, 2·457, H. 6–7, α 1·504, β 1·509, γ 1·545, 2V 35–36°, positive. Analysis (average of two): SiO_2 59·225, Al_2O_3 17·225, CaO 0·305, Na_2O 19·085, K_2O 0·865, S 0·085, Cl 0·04, H_2O+ 3·40, H_2O- 0·30 = 100·53, less O for S,Cl 0·06 = 100·47, gives $Na_2Al_2Si_6O_{16}.2NaOH$. Analyses of nepheline and sodalite are also given, and the paragenesis of the pegmatite minerals is discussed. [M.A. **7**–209.] S. I. T.

[Gerasimovsky (V. I.)] Герасимовский (В. И.). Эрикит из Ловозерских тундр.—Gerassimovsky (V. I.). *Erikite from the Lovozersky tundras.* Труды Ломоносов. Инст. Акад. Наук СССР, Мин. Сер. (Trans. Lomonossov Inst. Acad. Sci. U.S.S.R., Ser. Min.), 1937, no. 10, pp. 29–36, 3 figs. (Russian with English summary.)

This is the first discovery of erikite outside Julianehaab in Greenland (Min. Mag. **14**–398). It was found on the mountain Maly Punkaruayv, Lovozero tundra, Kola peninsula, in schlieren of sodalite-syenite, together with sodalite, ussingite, eudialyte, schizolite, &c. Erikite occurs as grains and imperfectly formed prismatic crystals with rough faces up to 1·5 cm. in length. The following forms were recorded: (100), (010), (001), (110), (130), (121), (101), (201), (111), (132), (211), (221), and (212), but the nature of the faces did not allow accurate measurement of the interfacial angles. The colour is pale yellowish-green, lustre pearly, cleavage absent, fracture uneven. Sp. gr. 3·77–3·79, H. 2–3. It is probably uniaxial and positive with α about 1·70 and γ about 1·73. Analysis by I. D. Borneman-Starynkevich: SiO_2 3·42, P_2O_5 24·31, Nb_2O_5 0·90, $(Ce,Yt)_2O_3$ 55·96, ThO_2 0·32, Al_2O_3 0·23, Fe_2O_3 0·30, MnO 0·12, MgO 0·98, CaO 1·57, SrO 0·90, Na_2O 1·05, CO_2 1·16, H_2O 7·39

= 98·61, gives $6P_2O_5$,$6(Ce,Yt)_2O_3$.$2SiO_2$.CaO.MgO.$15H_2O$. The presence of other elements was proved spectroscopically. S. I. T.

Chirva (E. F.) Чирва (Е. Ф.). Результаты кристаллографического и оптического изучения лопарита Хибинских тундр.— *Results of crystallographical and optical study of loparite of Khibina and Lovosero tundras.* Труды Ломоносов. Инст. Акад. Наук СССР, Мин. Сер. (Trans. Lomonossov Inst. Acad. Sci. U.S.S.R., Ser. Min.), 1937, no. 10, pp. 61–71, 5 figs. (Russian with English summary.)

Goniometric measurements of loparite show the prevalence of (100) and (111) faces among the 23 forms registered. The majority of crystals are twinned on the fluorite law. The colour of loparite is pitch-black and occasionally brownish-red. It is opaque with the exception of some light-coloured crystals which are semitranslucent. Sp. gr. 4·8975, 4·8934 (at 18° C.). Insoluble in acids and infusible before the blowpipe. Other chemical tests are also given. [M.A. **3**–275.] S. I. T.

Kravchenko (G. T.) Кравченко (Г. Т.). К изучению диаспора из турмалино-корундового месторождения 269-го квартала Нижне-Исетской дачи.—*On the study of diaspore from the tourmaline-corundum deposit in the 269-th block of the Niejni-Isetsky property (dacha).* Труды Ломоносов. Инст. Акад. Наук СССР, Мин. Сер. (Trans. Lomonossov Inst. Acad. Sci. U.S.S.R., Ser. Min.), 1937, no. 10, pp. 73–78, 3 figs. (Russian with English summary.)

Diaspore is found often replacing corundum in tourmaline-corundum deposits in antigorite-serpentinites near the contact with felspar-amphibolites. It is suggested that corundum was formed through the desilicification of serpentinite by the emanations of granitic magma. The colour of the diaspore is pale pink, lustre pearly, fracture conchoidal. Sp. gr. 3·4, H. $6\frac{1}{2}$, α 1·700, β 1·720, γ 1·748, optic axial plane (010), $\gamma = a$, 2V 84°, positive. Two morphological types of diaspore are distinguished, one characterized by the development of (111), (010), and (210), and the other by (011) and (010). S. I. T.

[Myasnikov (V. S.) & Florensky (V. P.)] Мясников (В. С.) и Флоренский (В. П.). Шеелитовые скарны Лянгарского месторождения и их отношение к скарнам других месторождений шеелита СССР.—Miasnikov (V.) & Florenski (V.). *Scheelite skarns of the Langarsky deposit and their relation to the skarns of the other deposits of scheelite in the USSR.* Труды Ломоносов. Инст.

Акад. Наук СССР, Мин. Сер. (Trans. Lomonossov Inst. Acad. Sci. U.S.S.R., Ser. Min.), 1937, no. 10, pp. 79–109, 19 figs. (Russian with English summary.)

Scheelite, molybdenite, powellite, and sulphide minerals are found in the garnet, pyroxene, amphibole, and idocrase skarns along the contact of the Lower Palaeozoic limestone and granite in the Nuratinsky range of the Uzbek S.S.R. The paper gives a geological and mineralogical description of the contact zones, and a comparison is made with other skarn deposits of central Asia. S. I. T.

Chukhrov (F. V.) Чухров (Ф. В.). О продуктах выветривания анапаита.—*On the products of weathering of anapaite.* Труды Ломоносов. Инст. Акад. Наук СССР, Мин. Сер. (Trans. Lomonossov Inst. Acad. Sci. U.S.S.R., Ser. Min.), 1937, no. 10, pp. 131–138. (Russian with English summary.)

Amorphous products of weathering of anapaite from the Kerch peninsula [M.A. 7–213] gave on analysis by N. A. Kozlovskaya (each analysis is an average of two): I brown glue-like variety, II green earthy variety, III green variety:

	P_2O_5.	SO_3.	Fe_2O_3.	FeO.	Mn_2O_3.	MgO.	CaO.	H_2O+.	Insol.	Total.	H_2O-.
I.	17·21	4·99	34·77	—	0·27	1·02	9·30	26·74	6·41	100·71	1·53
II.	24·48	2·66	31·54	0·78	0·88	0·71	12·26	18·99	8·19	100·49	11·52
III.	7·87	0·25	35·67	—	0·25	0·58	4·28	15·54	35·20	'99·55'	11·15

S. I. T.

Popov (V. S.) Попов (В. С.). Магнезиоферрит на реках Нижней Тунгуске и Илимпее.—*Magnesioferrite on the Lower Tunguska and Ilimpeja.* Труды Ломоносов. Инст. Акад. Наук СССР, Мин. Сер. (Trans. Lomonossov Inst. Acad. Sci. U.S.S.R., Ser. Min.), 1937, no. 10, pp. 157–167, 2 figs. (Russian with English summary.)

Magnesioferrite is found in nests and veins in tufaceous sandstones associated with basic igneous rocks (Siberian traps) of Permo-Carboniferous age in eastern Siberia. It is probably of hydrothermal origin. Five chemical analyses are given and some of them show an excess of Fe_2O_3 over that given by the formula $(Mg,Fe)O.Fe_2O_3$.

S. I. T.

Galbraith (F. W.) & Kuhn (Truman H.). *A new occurrence of dioptase in Arizona.* Amer. Min., 1940, vol. 25, pp. 708–710, 1 fig.

Prismatic dioptase crystals up to 10 mm. long and $1\frac{1}{2}$ mm. thick, and with the forms $m(10\bar{1}0)$ and $s(11\bar{2}1)$ line cavities in chrysocolla with wulfenite and descloizite at the Mammoth mine, Pinal Co. F. A. B.

Folinsbee (Robert E.). *The chemical composition of garnet associated with cordierite.* Amer. Min., 1941, vol. 26, pp. 50–53, 1 fig.

Wine-red almandine occurring in gneiss north of Great Slave Lake yields SiO_2 37·53, TiO_2 0·03, Al_2O_3 22·42, Fe_2O_3 0·74, FeO 32·53, MnO 0·66, MgO 5·74, CaO 0·16, H_2O+ 0·10, total 99·91. The composition of garnet associated with cordierite and biotite is discussed. [M.A. 7–523.]

F. A. B.

Pearl (Richard M.). *Spessartite in pegmatite at Mount Antero, Colorado.* Amer. Min., 1941, vol. 26, p. 54.

Reddish-brown spessartine crystals (211), (110), up to 12 mm. across occur in pegmatite at Mount Antero. F. A. B.

Caillère (*Mlle* S.). *Étude de quelques silicates magnésiens à facies asbestiforme ou papyracé n'appartenant pas au groupe de l'antigorite.* Bull. Soc. Franç. Min., 1936, vol. 59, pp. 353–374, 1 fig.

A general account of the chemistry, dehydration curves, and X-ray powder data of specimens of sepiolite, palygorskite, and paper-like kaolinite combining previously published data [M.A. **5**–334, 521].

F. A. B.

Drugman (Julien). *Contribution à l'étude des macles et groupements des phénocristaux de feldspath et de quartz-β.* Bull. Soc. Franç. Min., 1939, vol. 62, pp. 99–132, 2 pls., 7 text-figs.

An elaboration of work previously published: β-quartz [Min. Mag., **21**–366, M.A. **4**–127]; felspar [Min. Mag., **25**–1, M.A. **3**–380].

F. A. B.

Salo (O. J.). *Dahllite—a rare mineral.* The Mineralogist, Portland, Oregon, 1941, vol. 9, pp. 161–162, 188–189, 1 fig.

Dahllite occurs as spheroids up to 2 inches in diameter in the foothills of the Beartooth Mts., on the Montana-Wyoming state boundary. The core of the concretion is usually a brown crystal from which other crystals radiate to a pitted outer surface. J. M. S.

Gordon (Samuel G.). *Results of the Chilean mineralogical expedition of 1938. Part II—The crystallography of metavoltine.* Notulae Naturae, Acad. Nat. Sci. Philadelphia, 1940, no. 64, 5 pp., 1 fig. [M.A. **8**–87, 181.]

Metavoltine was found in abundance as yellow hexagonal plates with

other sulphates in quartz veins at La Compania. Several hexagonal pyramids were measured; $a:c = 1:0{\cdot}9468$ (*cp* 47° 33′); sp. gr. 2·51, ω 1·595, ϵ 1·581. Analysis by W. Pitman and P. Collins gave SO_3 44·22, Fe_2O_3 22·55, FeO 2·83, Na_2O 8·89, K_2O 4·82, H_2O+ 6·98, H_2O- 10·25 = 100·54, agreeing with $K_2O.3Na_2O.FeO.3Fe_2O_3.12SO_3.18H_2O+2H_2O$. This and all previous analyses agree with the general formula $5(R_2,R)O.3Fe_2O_3.12SO_3.18H_2O+nH_2O$; and the crystallographic data (not previously determined on natural material) agree with those of the artificial salt [M.A. **4**–271]. Other Chilean localities at which metavoltine was found are Chuquicamata and Quetena. L. J. S.

Palache (Charles). *Crystallographic notes: cahnite, stolzite, zincite, ultrabasite.* Amer. Min., 1941, vol. 26, pp. 429–436, 7 figs.

Two faces of the form (311) have been recognized on one end of a crystal of cahnite [M.A. **3**–365; Min. Mag. **25**–257]; the crystal class is therefore tetragonal bisphenoidal $\bar{4}$. Pale-yellow stolzite crystals (sp. gr. 8·26) from Primos mine, near Dragoon, Arizona, show the new form (137); the same mineral from Reef mine, Huachuca Mts., Arizona, shows new forms (320) and (121). Lemon to orange-yellow stolzite from Abuja, Northern Nigeria, has sp. gr. 8·34. Crystals of zincite (sp. gr. 5·66) from Franklin, New Jersey, show the form $(10\bar{1}3)$, and a crystal of artificial zinc oxide (sp. gr. 5·665) is figured for its 'new and striking habit of hemimorphism'. Ultrabasite [M.A. **1**–149] from the Himmelsfürst shaft, Freiberg, Saxony, is shown to be identical with diaphorite.

F. A. B.

Miser (Hugh D.) & Glass (Jewell J.). *Fluorescent sodalite and hackmanite from Magnet Cove, Arkansas.* Amer. Min., 1941, vol. 26, pp. 437–445, 1 fig.

Blue sodalite (sp. gr. 2·278, *n* 1·483) from the tinguaite rocks of Magnet Cove, gives SiO_2 36·36, Al_2O_3 32·09, Fe_2O_3 0·07, MnO 0·06, Na_2O 24·73, K_2O 0·12, H_2O+ 0·86, H_2O- 0·12, Cl 6·79, $CaCO_3$ (calcite) 0·50, total 101·70, less O for Cl 100·17. Associated white hackmanite (sp. gr. 2·286, *n* 1·487) gives SiO_2 36·70, Al_2O_3 32·01, Fe_2O_3 0·07, Na_2O 24·79, K_2O 0·17, H_2O+ 0·36, Cl 7·00, $CaCO_3$ (calcite) 0·29, total 101·39, less O for Cl 99·81. The sodalite fluoresces purplish-red to violet-red and the hackmanite a vivid reddish-orange in ultra-violet light. The lilac-rose colour assumed by the latter mineral on exposure to ultra-violet radiation fades rapidly in daylight. [M.A. **3**–118, **6**–503.]

F. A. B.

WINCHELL (A. N.). *The spinel group.* Amer. Min., 1941, vol. 26, pp. 422–428, 5 figs.

E. S. Simpson's graph [Min. Mag. **19**–99] is extended to represent the variation of specific gravity and refractive index for members of the spinel group whose composition can be expressed in terms of four end-members: spinel ($MgAl_2O_4$), hercynite ($FeAl_2O_4$), picrochromite ($MgCr_2O_4$), and chromite ($FeCr_2O_4$). A trilinear plot of spinel, gahnite ($ZnAl_2O_4$), and hercynite also shows refractive indices of spinels of intermediate composition. A more speculative double trilinear plot is given for spinels with end-members: magnetite ($FeFe_2O_4$), jacobsite ($MnFe_2O_4$), magnesioferrite ($Mg_2Fe_2O_4$), and franklinite ($ZnFe_2O_4$).

F. A. B.

WINCHELL (A. N.). *Nepheline.* Amer. Min., 1941, vol. 26, pp. 536–540, 3 figs.

Recent analyses of nepheline are calculated to give the proportions of hypothetical terms derived from $NaAlSiO_4$ by atom for atom replacement, viz. $KAlSiO_4$, $CaAlAlO_4$, $SiSiO_4$, $AlSiO_3(OH)$, and $CaCaSiO_4$. The relation of chemical composition to optical and specific gravity data is also considered. F. A. B.

SCHALLER (W. T.) & STEVENS (R. E.). *The validity of paragonite as a mineral species.* Amer. Min., 1941, vol. 26, pp. 541–545.

Alkali determinations of paragonite (var. cossaite) from Fenestrella, Piedmont, Italy; paragonite from Monte Campione, Switzerland; and of euphyllite from Corundum Hill, Pennsylvania, are Na_2O 7·26, 6·28, 5·64, K_2O 1·01, 2·17, 1·71 % respectively, verifying that paragonite is a valid species. [M.A. **6**–93.] F. A. B.

FOLINSBEE (Robert E.). *Optic properties of cordierite in relation to alkalies in the cordierite-beryl structure.* Amer. Min., 1941, vol. 26, pp. 485–500, 7 figs.

Prismatic crystals of cordierite from Great Slave Lake, Canada [M.A. **7**–523], yielded fragments of gem quality, sp. gr. 2·631, α 1·544, β 1·550, γ 1·556, 2V 85–95°, which gave on analysis SiO_2 48·19, TiO_2 0·01, Al_2O_3 33·45, Fe_2O_3 0·55, FeO 8·40, MnO 0·18, MgO 7·95, CaO 0·17, Na_2O 0·22, K_2O 0·02, Li_2O trace, H_2O+ 0·67, H_2O- 0·01, total 99·82. A review of previous data shows that increase of alkali content in cordierite increases the refractive indices, but decreases the birefringence and optic axial angle. Optically positive cordierite is low

in alkalis and high in calcium content. The recalculation of an analysis of an alkali-rich beryl suggests that three of the twelve beryllium ions are replaced by three alkali ions and one of aluminium. Whereas the Li and Na ions may replace Be ions, it is possible that the larger K, Rb, and Cs ions are located in the channels of the beryl structure. The relation of the structure, optics, and chemistry of cordierite to those of beryl is discussed fully. F. A. B.

Ruthruff (Robert F.). *Vermiculite and hydrobiotite.* Amer. Min., 1941, vol. 26, pp. 478–484.

An analysis of hydrobiotite from Libby, Montana, agrees with Gruner's result [M.A. **6**–181] that the mineral consists of alternate layers of vermiculite and biotite. Heating with dilute H_2SO_4 reduces vermiculite to white silica plates whereas hydrobiotite yields a mixture of silica and dark flakes believed to be biotite. Exfoliation of hydrobiotite, but not vermiculite, is produced when soaked in concentrated H_2SO_4. F. A. B.

Stewart (Glenn W.). *Idocrase and scapolite from Manchester, New Hampshire.* Amer. Min., 1941, vol. 26, pp. 509–511, 2 figs.

Columnar mizzonite sp. gr. 2·69, ω 1·591, ϵ 1·557 yields SiO_2 46·78, Al_2O_3 28·53, Fe_2O_3 0·22, MgO 0·25, CaO 17·98, Na_2O 6·50, K_2O 0·06, total 100·32. Other minerals from this locality are idocrase in calcite, ω 1·730, ϵ 1·719; grossular, n 1·755; and diopside. F. A. B.

Murdoch (Joseph). *Valentinite crystals from California.* Amer. Min., 1941, vol. 26, pp. 613–616, 1 fig.

Partially altered stibnite from Lone Tree Canyon, Kern County, bears minute elongated tabular crystals of valentinite with numerous unsymmetrically developed prism faces including new forms (560), (670), (12.11.0), (870), (970), and (750), but no pyramids or domes. The crystals are of unusual habit, being tabular on (001) and elongated in the direction of the a-axis. [$a:b:c$ = 0·3939:1:0·4339, M.A. **7**–261.] F. A. B.

Pegau (A. A.) & Overstreet (W. C.). *Occurrence of martite in micaceous hematite near Esmont, Virginia.* Amer. Min., 1941, vol. 26, p. 512.

Octahedra 2–7 mm. across, sp. gr. 5·1, H. 6, are stated to be martite after magnetite. About 15 % of the crystals examined were non-magnetic, others varied from feebly to strongly magnetic. The last contain more ferrous iron. F. A. B.